The Electrical Industry's Weekly Magazine

December 15, 1958

Electrical World

Price 50 Cents

A McGraw-Hill Publication

230-Kv Wood Structures Feasible for 345

EEI Unveils National Electrical Living Program . . . . . page 26

STEVENS RICE OS W
UNIVERSITY MICROFILMS IN
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DESIGNED FOR GREATER VERSATILITY . . .

General Electric Demand Registers Now Provide Time Intervals from 15 Minutes to 4 Hours

General Electric's M-30 indicating and M-31 cumulative demand registers provide time intervals ranging from the customary 15, 30, or 60 minutes up to the 4-hour standard now being considered by the electric utility industry. Such a wide latitude of demand-metering time intervals is desirable to adequately reflect the highly diversified demands of modern appliance loads. With G-E demand registers, therefore, promotion of load-building can be more compatible with equitable recovery of fixed service costs.

General Electric registers best solve the problem of flexibility, too, since changes in voltage rating, scale class, and time interval can be made easily and economically. Your General Electric apparatus salesman will be glad to tell you more about these two versatile mechanical demand registers. Or, write to General Electric Company, Section 628-24, Schenectady 5, N. Y.

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GENERAL ELECTRIC

Electrical World

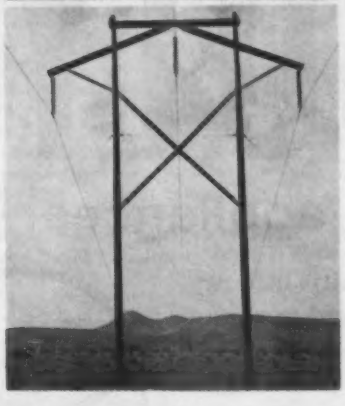
Vol. 150, No. 24 DECEMBER 15, 1958

Published for 84 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

p 75

p 32



p 34

CURRENT EVENTS

Commissioners Gun for Ellis and IRS

Utility regulatory commissioners act to investigate NRECA legislative proposals, rescind tax rulings on ads.....p 24

MANAGEMENT NEWSLETTER

How to Relieve Three PR Headaches

Tree trimming, rights-of-way, residential substations pose tough public relations problems. Here's one remedy.....p 75

GENERATION

Dresden Atom Sphere Is Leak Tested

T. H. Smith, Bechtel Corp; J. T. Dunn, Chicago Bridge & Iron Co; J. E. Love, General Electric Co

Pressure-differential leak rate method proves vessel's tightness and allows early resumption of construction.....p 32

INDUSTRIAL

Plan Your Transformer Maintenance

Here are check lists for inspecting and testing transformers in industrial substations.....p 37

SUBSTATIONS

British Use Concrete Substations

Experience shows concrete costs less for standardized 132-kv, 275-kv structures. Trend started in 1948.....p 31

TRANSMISSION

Can Wood Poles Be Used for 345-Kv Lines?

Ralph G. York, Hughes Brothers

Studies indicate that wood pole designs for EHV will be similar to the 230 kv inclined arm designs.....p 34

Departments

Books 70
Editorials 23
• Electrical Week 11
Engineering Reference Sheet 42
Executive Reader 14
From the Publisher..... 5
How To 36
• Management Newsletter ... 75
Manufacturers News 46
New Equipment 58
News About People..... 85
Readers Forum 96
Readers Service 66
Selling 72
INDEX TO ADVERTISERS... 96

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They Preach Electric Heating for Schools

We generally accept the proposition that your best salesman is a satisfied customer. It seems to us that this holds particularly true for school officials who are now operating schools which are electrically heated.

Reports reaching my desk indicate that the two most enthusiastic electric heating salesmen to appear on industry programs this year have not been utility men or even manufacturers' salesmen. Rather they have been a school principal and a school superintendent, both of whom now operate electrically heated school buildings.

Both these men, one from St. Louis County, Mo., and the other from Hartford City, Ind., speak glowingly and without reservation for safe, clean electric heating in schools. They'll talk about operating costs and the less tangible benefits of electric heating.

These men and others like them in school systems around the country might serve as valuable, part-time consultants to utilities considering promoting electric heating in schools.

In any event, such satisfied customers can make very effective contributions to public or private presentations for introducing this new heating system for schools.

Fischer Black

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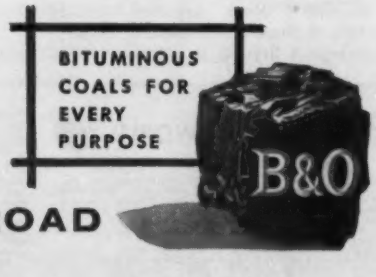
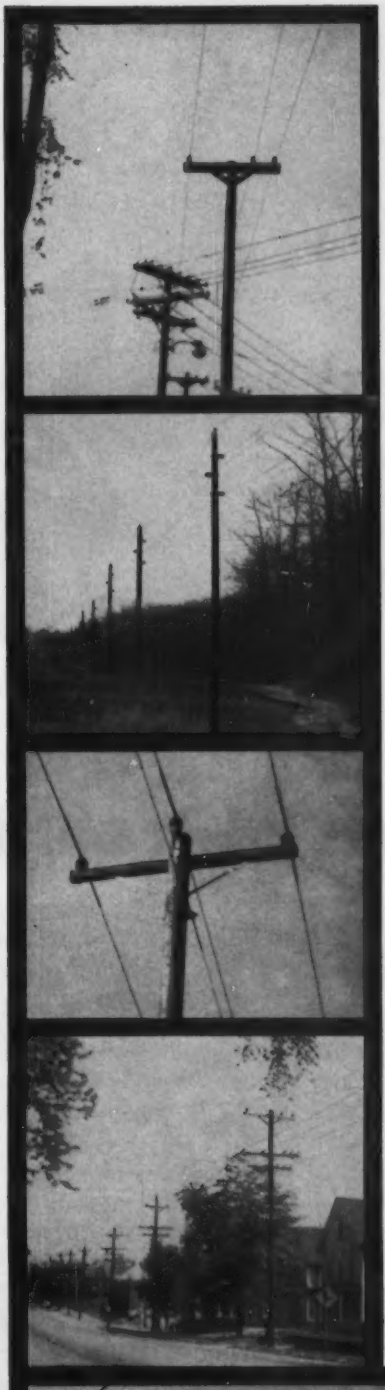


BALTIMORE & OHIO RAILROAD



LAPP DISTRIBUTION POSTS

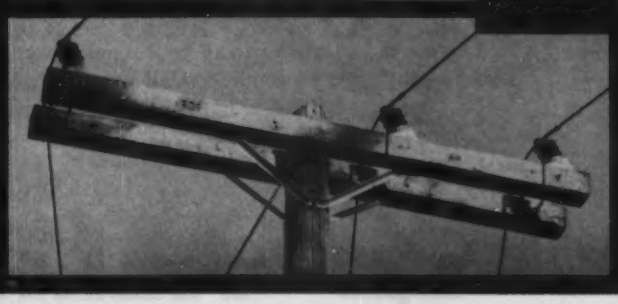
Line Post reliability for distribution lines up to 27 kv

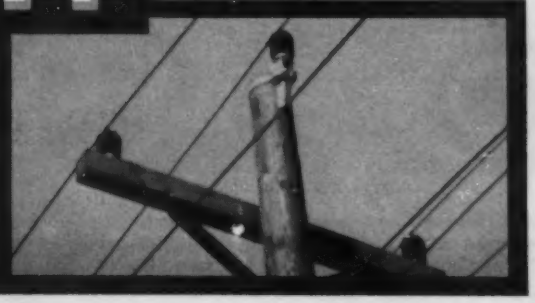
No distribution line you can build will serve as dependably, save as much sleep for your maintenance crews, or build as much customer good-will, as the one you put on Lapp Distribution Posts. These trim-appearing "junior Line Posts" just won't puncture . . . their solid one-piece porcelain body separates conductor from ground for its full length. Won't crack either . . . the only metal-to-porcelain joint is at the base; loading of porcelain is only in large-area, low-intensity compression. Greatly more resistance to flashover and impact, too . . . has short super-sturdy petticoats, with extra protection against failure in the fact that when petticoats are broken away, the post body remains intact with almost its full insulating values. Completely free of radio- or TV-interference at any operating voltage. Fog-type for superior performance in dust or atmospheric contamination.

Where else can you get so much for so little cost? Better look into it.

Lapp Insulator Co., Inc., Le Roy, New York.

Lapp





Forward Look in POWER

at Chrysler Stamping Plant with

28 lines of stamping presses are assured uninterrupted electric power by selective schemes

All the auxiliary switchgear for a complete power plant—and all of it on a common aisle! This unusual installation includes, from left to right, 480-volt, 2400-volt substations and 13.8-kv switchgear.

THE enormous load requirements of Chrysler Corporation's new 34-acre stamping plant at Twinsburg, Ohio: power for 260 presses ranging in speeds from ten to thirty strokes per minute; stamping forces up to 1600 tons; welding loads; lighting loads — all are met by the efficient use of primary and secondary substations and primary distribution equipment.

Chrysler engineers, after analyzing the specific requirements of the plant, designed a system which most adequately met the needs for supplying reliable power. Allis-Chalmers switchgear fills the requirements for dependable, uninterrupted service.

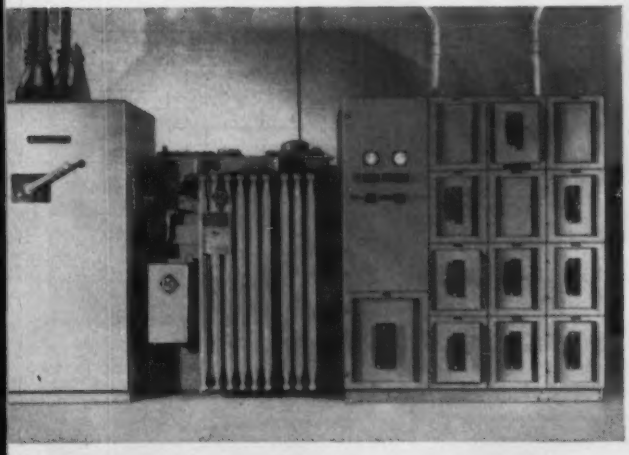
The result is a modern power distribution system combining flexibility, reliability and full power for all stamping, welding and lighting loads.

You'll find the answer to all your plant power needs in Allis-Chalmers equipment. Call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

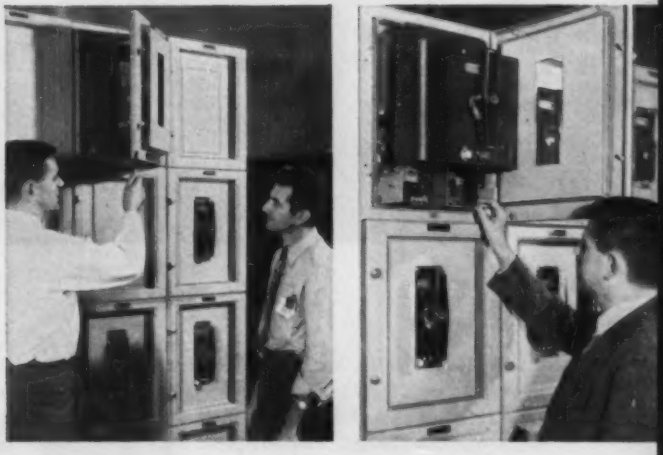
ALLIS-

There are 9000 kva of unit substation equipment in this one room! This equipment was located close to the load center by placing it in a room directly above the production area it serves.

Allis-Chalmers Switchgear



An Allis-Chalmers *First*, the reversible door panel provides breaker storage inside cubicle. Note that three panels are reversed or protruding to provide the additional space in the cubicle for storage of disconnected breaker.



Breaker compartment door swung open showing depth of reversible door panel, eliminating need for extra storage space. Calibrated scales on trip adjusting knobs provide accuracy of settings, action, adjustment and indication.

CHALMERS

A-5764

New Slide Rule Free!

. . . for selecting your air circuit breakers in new secondary unit-sub installations, or checking safety of existing breakers.

Permits accurate and fast calculation of short circuit RMS amperes and interrupting capacity of feeder breakers. Write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Federal Pacific Metal-Clad Switchgear is made compact...rugged... and in increasing numbers!

Federal Pacific Metal-Clad Switchgear does the job—it's proven by the growing list of installations across the United States and abroad. Most important, Federal Pacific does it with stronger materials, fewer parts, most modern design, and complete safety to operating personnel.

It's rugged...it's safe...it's easy to maintain...it's accepted!

For the full Federal Pacific Metal-Clad Switchgear story call your Federal Pacific engineer or write for Catalog No. 3-440, Federal Pacific Electric Company, Newark, New Jersey.

FEDERAL PACIFIC

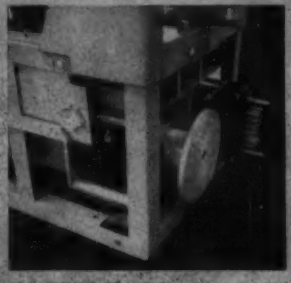
The Best in Electrical Distribution and Control Equipment

FEDERAL PACIFIC METAL-CLAD SWITCHGEAR OFFERS UTILITIES THESE SPECIFIC ADVANTAGES:

• **BREAKER MECHANISM IS COMPLETELY SELF-CONTAINED**—Attached to frame by *only four bolts*. No bearings or shafts are in contact with frame. Breaker mechanism can be removed for inspection and maintenance as a unit—simply and quickly.

• **PRIMARY DISCONNECTS ASSEMBLY MOUNTS ON BREAKER AS A UNIT**—Complete six stud bushing sub-assembly mounted directly on breaker facilitates inspection and service.

• **SIMPLE RACKING-IN MECHANISM**—Only two moving parts...provides positive safety inter-locking in any position.



• **CLOSING SOLENOID MAINTAINS TORQUE TO END OF STROKE**—Plunger disc gives solenoid additional pull at the end of the stroke when most needed...to compress closing springs and make positive contact.

The Electrical Week

FUTURE NEWS ▶ **Look for public power groups to ask for more A-power projects to be built with government money. Power produced from these projects would be sold under preference clauses.**

LATE NEWS ▶ **Corps of Engineers recommends twelve new hydro projects** on the Columbia River, including a high Mountain Sheep dam. Initial installed capacity of these projects would be nearly 3.2 million kw.

Philadelphia Electric Co A-plant will be located at Peach Bottom, Pa., about 10 miles up the Susquehanna River from Conowingo Dam.

Washington notes . . . AEC Commissioner Floberg drops a hint that the Commission may have to reduce the number of reactors planned for next year for budget reasons . . . It appears that the January FPC hearing on the ECAP tax case will be indefinitely postponed almost immediately after it convenes to permit an appeal to the full commission on what the issues in the case are to be . . . Democratic Advisory Council has called for a bundle of power legislation from the 86th Congress, covering: TVA-self financing; big-scale atomic reactor development program; more Federal power starts; and a stronger REA lending program.

New England G&E enters petrochemical field through new subsidiary which will build plant to extract chemicals from products of company's New Bedford G&E subsidiary.

Management changes . . . H. E. Ayer becomes president of Suburban Electric and continues as president of Lynn G&E . . . C. T. Wanzer is named vp and chief engineer for Duke Power.

Power output hits 13 billion kwhr in the week ended Dec. 6, a record high.

POWER OUTPUT—UP 5.7% (Week ending Dec. 6), Kwhr 13,017,000,000

Per Cent Change From Previous Year

	Nov. 22	Nov. 29	Dec. 6
Total U. S. ...	+8.7	+8.7	+8.7
New Eng.	+8.6	+9.5	+8.9
Mid. Atlantic..	+3.3	+4.0	+6.1
Cent. Ind.	+1.5	+6.1	+6.2
West Cent. ...	+3.2	+7.0	+7.6
Southeast	+1.5	+4.1	+4.0
South Cent. ...	+8.2	+8.2	+6.9
Rocky Mount...	+7.0	+5.6	+6.7
Pacific			
NW	+4.1	+4.5	+3.5
SW	+8.5	+7.9	+5.2

Seasonally Adjusted Index 242.0

Week Ago 241.3 Year Ago 229.2

Source: Edison Electric Institute

EVENTS ▶ **Four resolutions affecting the electric utility industry were passed at** the 70th annual convention of the National Association of Railroad & Utilities Commissioners recently. They were:

- Look into the proposed legislative policies and objectives of the National Rural Electric Cooperative Association;
- Rescind the Bureau of Internal Revenue ruling on institutional advertising;
- Support legislation regulating and controlling nuclear radiation hazards; and
- Adopt revision of the Uniform System of Accounts.

The whys and wherefores of this week's lead news story are covered on p 24.

EEI unveiled its "National Electrical Living Program" (NELP) this past week in New York. The $2.5 million, 126-utility backed program has one basic objective: To sell more appliances, wiring, lighting—and hence more kwhrs—in American homes. How EEI plans to attain this objective is covered in the story on p 26.

Private utilities plan to counter turn-around on TVA fringe. Both Georgia Power Co and Kentucky Utilities Co are mapping strategy to check the shift of towns in their territory from private to public power. This porridge of politics and power is served up on p 27.

GENERATION ▶ **How do you leak-test a 3.6-million cu-ft steel sphere easily** and accurately? Engineers building Commonwealth Edison Co's Dresden A-power station were faced with the problem of leak-testing by a pressure method the 190-ft diameter steel sphere which will house the boiling water reactor and four secondary steam generators. They solved it by measuring the differential pressure change between the sphere and internally mounted reference vessels of known pressure tightness. This method, in addition to eliminating temperature errors, also saved time and money. It cut normal one-week testing time to 30 hr. The details on p 32.

SUBSTATIONS ▶ **The British use reinforced concrete in substation construction,** and have been using it successfully since 1948, when steel was hard to get. They have continued the practice, pointing to two advantages: (1) Generally, costs are 10 to 20% lower than steel; and (2) Maintenance costs over a 15-yr period are almost nil (p 31).

TRANSMISSION ▶ **Wood poles may be feasible for 345-kv transmission lines.** Successful experience with 230-kv operating wood-pole lines and some 345-kv experimental lines have caused operating departments in several utilities to sit up and take notice. This week's cover story is heavily illustrated, beginning on p 34.

INDUSTRIAL ▶ **The second article in a transformer-maintenance series appears on** p 37. The first article, covering testing of oils and insulation, was

published in EW on Aug. 28. This one covers transformer inspections—visual and complete—the conditions and frequency under which they should be conducted, and procedures for carrying them out. Charts and a step-by-step outline are also provided.

ENGINEERING REFERENCE SHEET ▶ **New IES recommended lighting levels for industrial areas** are given in this week's Engineering Reference Sheet. Based on the findings over 10 years of the Blackwell team at the University of Michigan, they are for specific industrial seeing tasks. Table I on **p 42** covers the first group of such areas, a second is coming Dec. 29.

MANAGEMENT ▶ **PEPCO's prescription for relieving three PR headaches**—tree trimming, rights-of-way acquisition, and residential substations—appears on **p 75**. . . . Goodbody & Co offers a new yardstick for measuring utility growth. It's net plant—the difference between gross plant and the depreciation reserve. To see how the top 25 utilities in net plant growth stack up, turn to **p 77**.

MANUFACTURERS ▶ **A record 14,903 Mw is scheduled to go into service in 1958,** according to Edison Electric Institute's 24th Semi-annual Electric Power Survey. Other survey high points: Steam turbine-generators of 200 Mw and above comprise 46.2% of the scheduled expansion; Total capacity (U.S. and foreign) is 18,105 Mw; Waterwheel generators total 3,868 Mw; and hydraulic turbine capacity, including U.S. industrials and foreign, adds up to 3,674,500 hp. Other details in the survey are published beginning on **p 46**.

NEW EQUIPMENT ▶ **Gear box for torsional operating mechanisms of power switches** mounts easily at most convenient height without cutting or drilling the operating shaft . . . High voltage capacitors are installed in standard sections mounted on a continuous base. Basic section contains 1,200 kvar of capacitors and an interlock and grounding device . . . Drive units of a new line show size reductions up to 35% over comparable existing units from 3 to 350 hp (**p 58**).

SELLING ▶ **Chicago's State Street is flooded with 14 ft-candles,** reportedly making it the brightest lighted street in the world. The seven-block, 70-pole unique street lighting job has 280 fluorescent luminaires. Total output is 223,200 lumens per pole. The system is radio-controlled, turns on at dusk, off at dawn (**p 72**).

PEOPLE ▶ **New Kansas Power & Light vp's are B. S. Cohn and J. G. Williamson** . . . C. H. LeVee has been named vice president, engineering, at A. B. Chance Co . . . Enjay Co, Inc, subsidiary of Esso Standard Oil Co (N.J.), has named J. E. Wood III as president. Three new vp's are K. J. Nelson, H. J. Rose, and A. D. Green . . . E. P. Hansen has been appointed chief engineer of Allis-Chalmers' steam turbine department (**p 85**).

Freshman enrollment in engineering schools is down 12%, or about 4,800 students, according to reports from 62% of engineering schools. The Office of Education offers no explanation beyond suspecting a recent rash of published stories saying the shortage of engineers was over. **Construction Daily-Newsletter, Nov 3, 1958.**

TECHNICAL NOTES

Surge impedance load of a two-conductor bundle line is about 25% greater than that of a one-conductor line. Stability conditions being equal, transmission capacity is increased by almost as much.

When a steam power plant is operated in the critical cycle, the fluid pressure must never be allowed to fall below 3,206 psi or else localized boiling will occur.

Rising power factor of a transformer oil indicates a decrease in the oil's resistance. This is caused by presence in the oil of moisture, asphalt compounds, suspended carbon, solutions of other insulating compounds, or oil-soluble varnish.

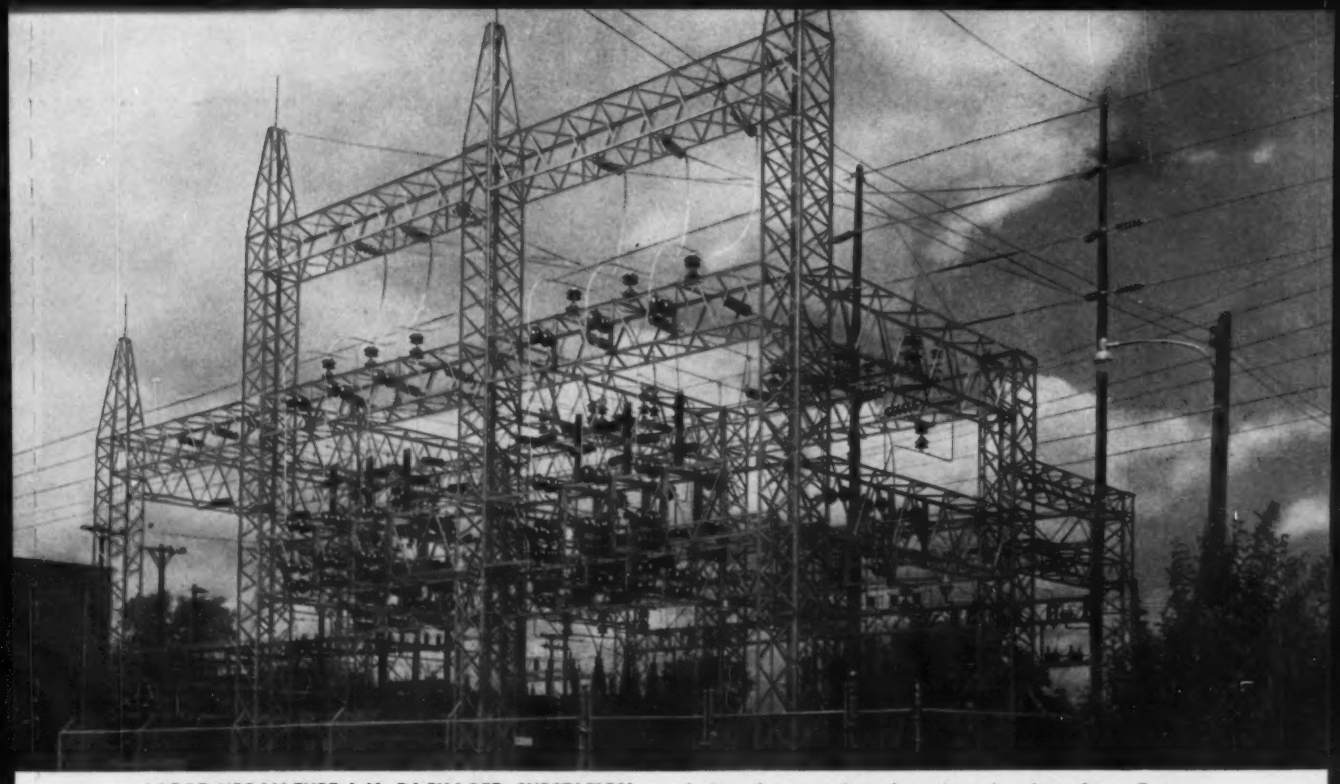
Operation in the 2,000-3,000 C range is reported for ceramic-type solid-state thermoelectric materials. Described as mixed valence compounds of the transitional metals, the materials exhibited conversion efficiencies considered promising.

Water jets forced the extinction of residual arcs on long 220-kv lines following single-pole interruption of single-phase-to-ground faults. The principle can be used up to the highest known voltages and on very long lines.

Damping resistors and capacitors will prevent overvoltages by suppressing oscillatory processes which arise in mercury-arc rectifiers on dc transmission lines during transient conditions.

FROM EDITORS IN THE FIELD

Interruptions due to transformer faults are avoided on a 115-kv line through use of a special expulsion breaker installed at the transformer, reports a southeastern utility. The breaker uses standard fuse tubes with internal contacts.



LARGE URBAN-TYPE L-M PACKAGED SUBSTATION, designed by Line Material and erected in minimum time with L-M prefabricated steel. Incoming lines are 69 kv; outgoing are 7.2/12.47 kv. L-M engineers design these packaged stations in sizes from 5 to 161 kv, for industrial plants, and for rural and urban locations on utility company lines—all with completely coordinated plans, structure, and equipment.

L-M-Engineered Packaged Substations Save Planning and Construction Time

by **W. V. SWAN**, Product Manager
Substations and Power Switching Equipment
Line Material Industries

Line Material packaged substations offer wide choice of design and application; considerable flexibility and provision for future expansion; great savings in engineering and ordering for utilities. And, because of L-M's unique prefabricated steel structure, these substations are fast and easy to erect.

One Order Does It!

Completely coordinated L-M substations need only one order; are delivered either as one shipment or coordinated to your construction schedule. It's easy to order an L-M substation. Just give us a one-line diagram of what you want—or tell us your voltage, kva requirements, number of incoming lines and outgoing feeders, and area available—and we'll design your substation for you!

Fast Erection

L-M's pre-engineered steel trusses and columns are completely prefabricated, and shipped knocked down or factory-assembled. Structures are steel, or aluminum alloy. Members have round holes punched at 3-inch intervals (before galvanizing) with square holes every foot. This eliminates measuring and drilling, and damage to galvanizing. Holes accommodate all bolts for lacing members and apparatus. That's why they go up so fast.

Prompt Shipment

Structural steel can be shipped in 3 to 4 weeks after final approval of order; complete stations in 4 to 12 weeks. Station design provides for easy, safe accessibility to all equipment. Stations meet NEMA, ASA and AIEE standards.

Ask the L-M Field Engineer for complete information and bulletins; or write Line Material Industries, Substation Department, Milwaukee 1, Wisconsin.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY

382

Packaged Substations

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

When a motor we installed single phased, — Fusetron Fuses saved our reputation and a $200 rewind job

C. B. Meldrum, OWNER
MELDRUM ELECTRIC COMPANY
HOUSTON, TEXAS

Mr. Meldrum continues:

"Recently I sent several of my men to install a 50 h. p. air conditioning unit for a customer.

"It seems that my man who wired the 200 amp. switch failed to tighten a lug. He just hung the wire on the lug and then forgot to tighten it.

"When the unit was started, it didn't take long for trouble to develop. The loose connection caused one Fusetron fuse to blow. The motor started to run single phased but before any damage could result the other Fusetron fuses protecting the motor also blew and shut down the motor.

"My company stands behind its work. If the motor would have burned up, we would have rewound it without question. I know this would have cost us at least $200.

"What is important too, our reputation was saved and we have a satisfied customer. If the Fusetron fuses had not given us an opportunity to go back and do the job right before the motor was damaged, we would have been in a 'hot' spot."

For safe, modern, money-saving protection install FUSETRON dual-element FUSES and BUSS Hi-Cap FUSES throughout entire Electrical System!

Why Fusetron Fuses Provide Safest, Simplest Way to Prevent Damage from Single Phasing

When single phasing occurs, the current in the remaining phase increases about 100%. (Theoretically 73% but change in efficiency and power factor makes it about 100%.

This 100% overload on Fusetron fuses of motor-running protection size opens them and shuts down the motor.

Such dependable protection against motor burnouts from single phasing has never before been available.

You too, Can Get Safer, More Dependable and Money-Saving Protection with Fusetron Fuses

FUSETRON dual-element fuses provide 10 point protection against electrical troubles. This is unlike circuit breakers or ordinary fuses which, except in rare cases, protect only against short-circuits.

In Addition: Fusetron Fuses Require No Maintenance or Recalibration

They are calibrated at the factory by engineers. Once properly installed, they require no inspection or down-time necessary on mechanically operated devices. There are no hinges, pivots or contacts to stick or get out of order. Dust, corrosion or oxidation cannot increase a Fusetron fuse's capacity or lengthen its blowing time.

After years of inactivity, a Fusetron fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

For Loads above 600 and up to 5,000 amps . . . Use BUSS Hi-Cap Fuses

They have an interrupting capacity sufficient to handle any fault current regardless of system growth.

They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuit of origin.

for more information, write for . . . **Bulletin FIS on Fusetron fuses**
Bulletin HCS on BUSS Hi-Cap fuses.

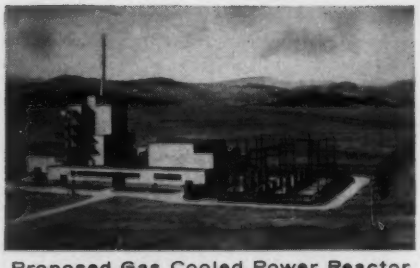
BUSSMANN MFG. DIVISION - McGraw-Edison Co. *University at Jefferson, St. Louis 7, Mo.*

FUSETRON · TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION · BUSS · McGRAW EDISON · BUSSMANN MFG. DIVISION · St. Louis 7, Mo.

call KE for plant expansion or new facilities

INGENUITY

has made KE the experienced leader in nuclear projects



Proposed Gas Cooled Power Reactor Plant designed by Kaiser Engineers for the Atomic Energy Commission.

Cost-saving and time-saving ingenuity, plus a wealth of nuclear experience—these are two of many reasons why Kaiser Engineers has been selected for so many of America's challenging nuclear projects. To date, construction value of KE nuclear projects is more than $200,000,000.

KE provides complete nuclear engineering and construction services—including concept feasibility, reactor criteria, facility design, construction and test operations.

KE nuclear specialists are ready to serve you today. Call KE for design and construction, or any aspect, of nuclear research, production or power facilities.

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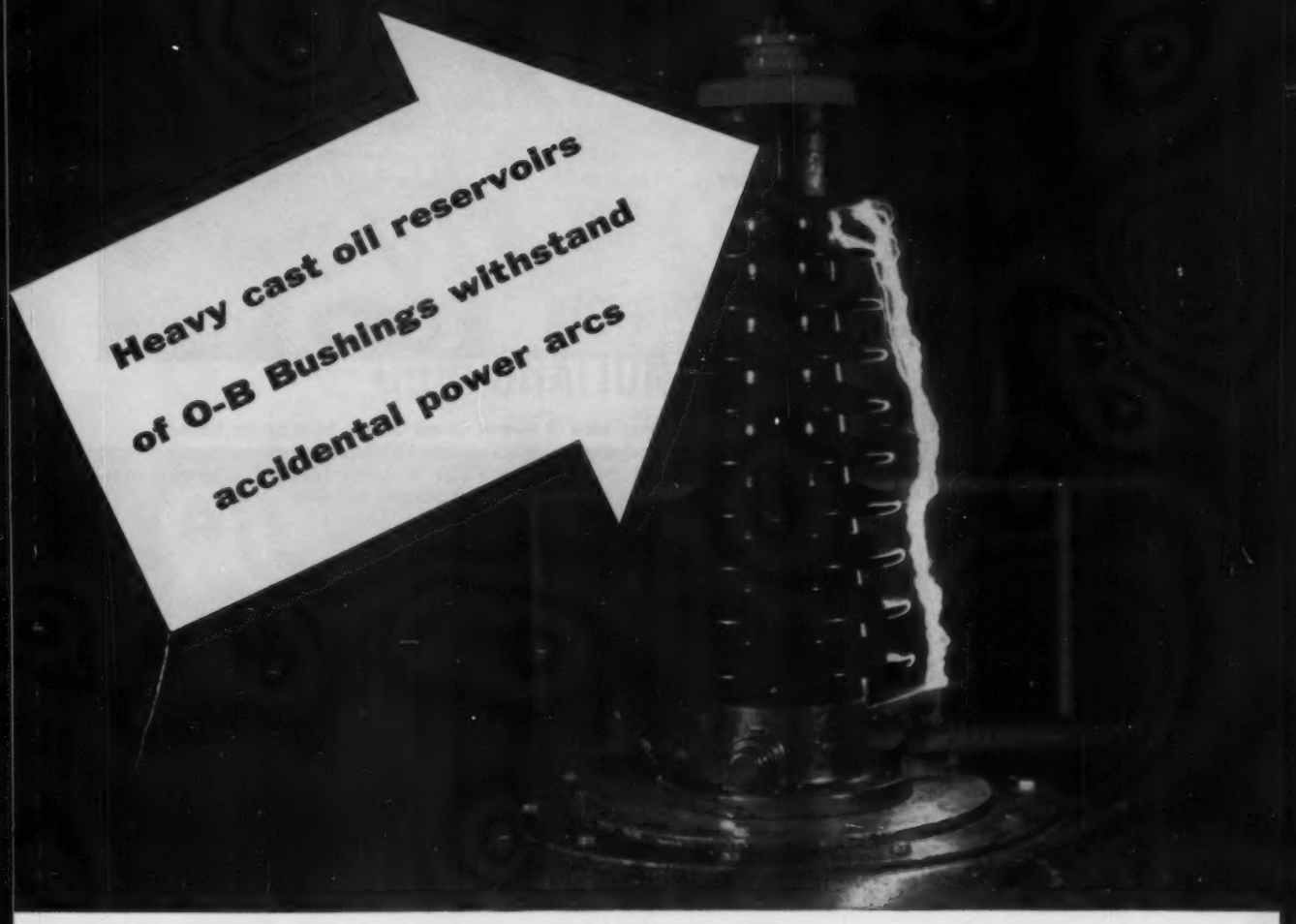
You can't poke a hole in it!



Why make a bushing's oil reservoir in the form of a heavy bronze casting? Isn't it wasteful? After building bushings this way for 50 years, maybe we just can't break with tradition.

Granted, 50 years' experience has a lot to do with it. On rare occasions, the reservoir may serve a special purpose. In the event of flashover, it is one terminal of a blazing power arc. This can burn a hole in a flimsy part, and the bushing is lost. Heavy cast bronze won't permit this -- it hasn't, so far as we know, in 50 years. The small extra cost involved is simply an investment in maximum safety and service.

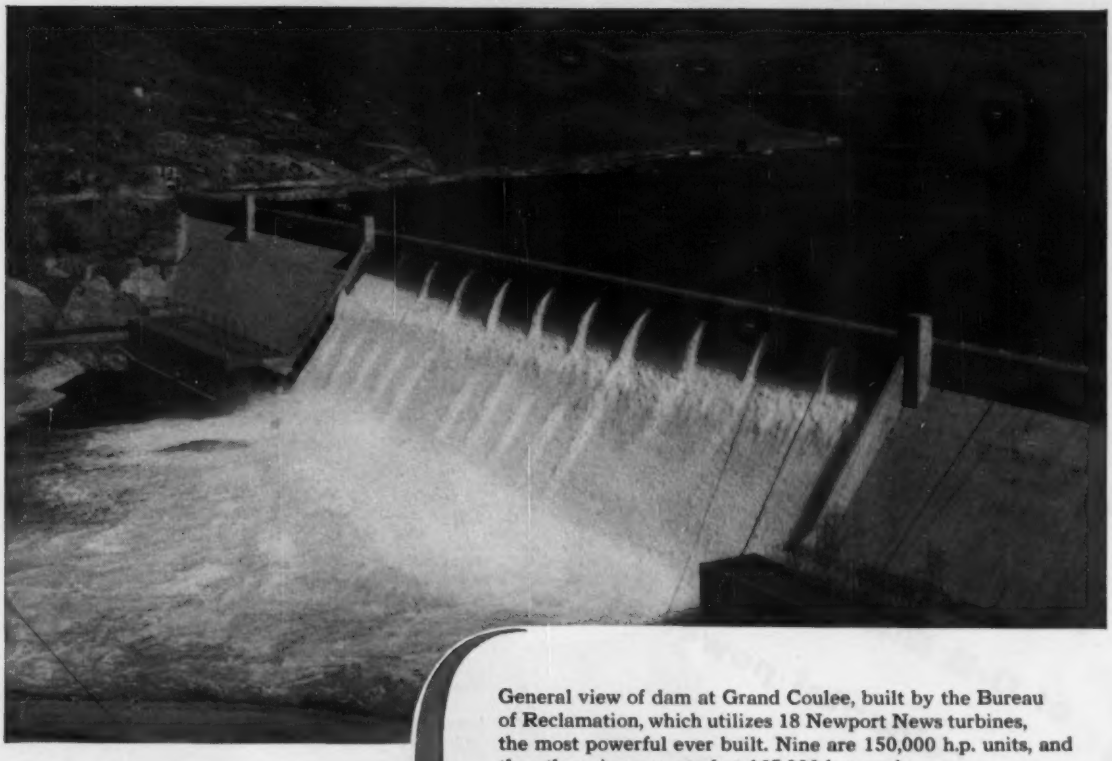
One of the intangibles you buy in modern O-B condenser bushings is mature knowledge of the business. This shows-up in all kinds of ways and places. It's "the extra value in the package."

Manufacturers of transformers and circuit breakers are glad to supply the bushing of your choice, *when you express that choice.* Make a point of asking for O-B bushings. It's very well worth the slight extra attention.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Lt., Niagara Falls, Ont.

Ohio Brass

4868-H



General view of dam at Grand Coulee, built by the Bureau of Reclamation, which utilizes 18 Newport News turbines, the most powerful ever built. Nine are 150,000 h.p. units, and the other nine are rated at 165,000 h.p. each.

Specialists • • • in building Water Power Equipment

Typical Users of Newport News Equipment

PLANT	LOCATION
Boone	Tennessee
Buchanan	Texas
Caonillas	Puerto Rico
Chief Joseph	Washington
Clark Hill	South Carolina
Deer Lake	Newfoundland
Folsom	California
Fort Patrick Henry	Tennessee
Hiwassee	Tennessee
Hoover	Nevada
J. H. Kerr	Virginia
Jim Woodruff	Florida
Lower Salmon	Idaho
Norris	Tennessee
Rock Creek	California
Santee-Cooper	South Carolina
C. J. Strike	Idaho
Whitney	Texas
Wilson	Alabama

Turbines designed and built for the world's largest development at Grand Coulee... and for other hydroelectric installations in America and various parts of the world... bespeak the skill and facilities offered by Newport News.

This trained organization has filled hydroelectric turbine contracts with an aggregate rated output of 7,000,000 horsepower.

Other equipment designed and built by Newport News includes penstocks, pressure regulators, valves, pumps, gates and rack rakes. Upon request, a copy of our illustrated booklet entitled "WATER POWER EQUIPMENT" will be sent to you.

Newport News
SHIPBUILDING AND DRY DOCK COMPANY
Newport News, Virginia

BERGEN GETS 8 LJUNGSTROMS®
...AND SOME REMARKABLE CUSTOMER SERVICE

Public Service's new Bergen Generating Station will be served by 8 large, horizontal Ljungstroms. Almost as important . . . the Ljungstroms will be serviced *throughout* their life by Air Preheater.

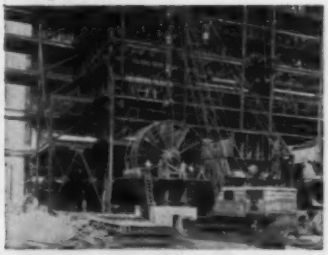
What's special about this customer service? For one thing, it's the considerable knowledge and talents of Air Preheater's engineers. They have been involved in nearly every conceivable type of boiler/preheater problem. They've seen how these problems can be handled. And they can put this experience to work for operators of Ljungstrom air preheaters.

Your Air Preheater engineer also makes regular calls to check the operation of every Ljungstrom – for as long as it's in service. (This now includes installations dating back to 1923.)

So, when you select a Ljungstrom, you're never entirely on your own. You *continue* to be the responsibility of a competent Ljungstrom engineer and benefit from his experience and knowledge. Maybe that's why 9 out of 10 preheaters sold are Ljungstroms.

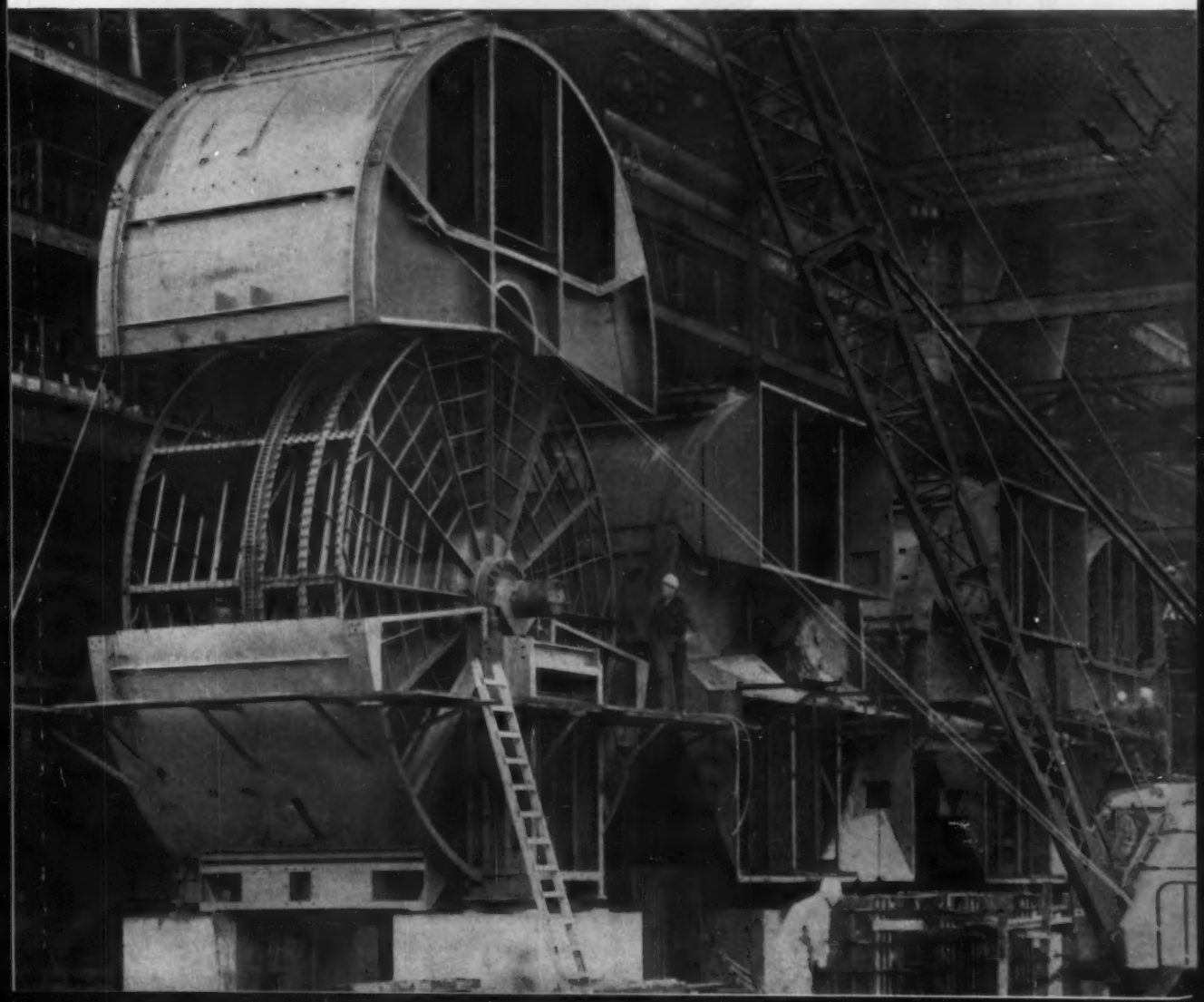
Thirty-five tons of Ljungstrom rotor being lowered into place at the new Bergen Generating Station at Ridgefield, N. J. (When the heating elements are installed the rotor will weigh 150 tons.) This is one of eight preheaters being installed by Public Service Electric and Gas Co. to serve two boilers – each evaporating 1,900,000 lbs of steam/hr. The first boiler is to be fired early next year. Anticipated preheater outlet temperature is about 275 F.

Public Service is one of the first Northern utilities to use large-size horizontal preheaters. They have nine such horizontals in operation at their Linden Generating Station and have ordered eight more for their new Mercer Generating Station.



THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.



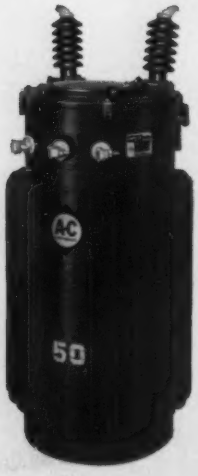
There's a good reason WHY...

QUALITY CONTROL

penetrates every operation at Allis-Chalmers

TOP QUALITY

distribution transformers



ALLIS-CHALMERS transformer engineers have *lived* quality control for more than 50 years. They've studied the methods and equipment of suppliers and kept in touch with their developments. As a result, these skilled engineers are able to specify the highest standards for materials, designs and manufacturing procedures. In fact, all material, every step of manufacture, every detail of assembly, are subjected to stringent quality control procedure. Because standards are never compromised but often exceeded, Allis-Chalmers transformers always perform as predicted... always give long, dependable service.

For *all the good reasons why* Allis-Chalmers distribution transformers deliver outstanding performance for many years, call your A-C man. Or write to Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

A-5726

Dollars to Support a Belief

Congratulations are in order for Philadelphia Electric Co and the 51 other electric utilities companies for their offer to build a 40-Mw gas-cooled, nuclear reactor plant (EW Dec. 1, 1958).

There are several things about this offer that strikes us as being outstanding. For one thing several of the participants are already active in other nuclear projects. So this additional contribution required the utmost in financial planning. In fact the complexities of coordinating the efforts of such a great number of companies are alone cause for congratulations. We understand that several key executives made efforts far beyond the call of duty on this project.

And last but surely not least, this high-temperature, high-pressure plant will contribute substantially to our quest for economically competitive nuclear power.

In All Fairness to American Manufacturers

There seems to be more than a little justification, today, for the charges by domestic manufacturers that the policies, terms, and conditions under which federal agencies purchase heavy electrical apparatus unfairly favor foreign firms.

A recent and dramatic illustration is provided by the protests leveled by two major electrical manufacturers (EW Dec. 8, p 68) against specifications in the invitation to bid on three 60,000 kva hydro-generators for TVA.

When this job was first offered, General Electric declined to bid on the grounds that liquidated damage clauses favored foreign bidders. More recently, while award of the contract to Brown Boveri was still pending, Allis-Chalmers officials appeared before the TVA board of directors to protest the terms and conditions of the specifications.

In arguing the case of the U. S. manufacturers, J. L. Singleton, vice-president of Allis-Chalmers and president of the National Electrical Manufacturers Association, stressed, among other points, two important differences in the conditions imposed on domestic and foreign bidders.

1. U. S. manufacturers are bound by laws that dictate the minimum wages that they must pay.

2. Government regulations require that domestic firms purchase materials for government contracts from companies in the United States.

In all fairness it would appear that if the minimum wage requirement does not apply to all bidders on a government contract it should not apply to any of them. True, removal of such a restriction will have little effect on the real outcome, but it at least has the important virtue of putting all competitors on the same footing.

While the purchasing policies of federal agencies, TVA and others, do not restrict purchases to American firms, they do require that domestic manufacturers buy materials for government orders from U. S. firms. After all, if the government can shop foreign markets for finished products, domestic manufacturers should be free to shop the same market for minimum cost raw materials used in the finished product.

Finally, if executive orders and federal policies are to dictate "low bidder" preferences on purchases of electrical apparatus by government agencies then the least that should be done would be to relieve American manufacturers of restrictions that foreign manufacturers do not have to meet.

Ellis, IRS Draw Commissioners' Fire

Regulatory men resolve to keep tabs on co-op manager's legislative aims, urge that ECAP ad ruling be dropped

Four resolutions affecting the electric utility industry were passed at the 70th annual convention of the National Association of Railroad & Utilities Commissioners recently. They were:

1. Look into the proposed legislative policies and objectives of the National Rural Electric Cooperative Association.

2. That the Bureau of Internal Revenue ruling on institutional advertising should be rescinded.

3. Support legislation regulating and controlling nuclear radiation hazards.

4. Adopt revision of the Uniform System of Accounts.

The first resolution stated that public reports indicate that the co-op group through its general manager, Clyde Ellis, intends to make legislative demands on Congress and state legislatures in forthcoming sessions. The resolution said the proposals appear to constitute an "unwarranted invasion of state regulation." It, therefore, empowered the NARUC president, along with two legislative committees, to look into these matters and determine what policy NARUC may desire to take.

The second resolution said that the Internal Revenue Service had ruled that the cost of institutional advertising, published under the Electric Companies Advertising Program (ECAP), is not deductible for the purpose of computing federal income taxes. The resolution said the ruling should be "rescinded and annulled" and a copy be sent to the Bureau of Internal Revenue.

NARUC went on record in the third resolution to support state legislative action to effectively supplement federal action and coordinate the efforts of various state agencies concerned with the regulation and control of nuclear radiation hazards.

The fourth resolution urged that the revised Uniform System of Accounts for electric utilities be adopted by state commissions with "such modifications only as they may deem necessary in the public interest."

Economic Liberty Eroding

NARUC's retiring Pres Edward R. Thornton of New Hampshire mentioned the social legislation "that is slowly eroding the foundations of our economic liberty, by concentrating power in the federal government."

The electric and insurance industries, he said, have been fighting against public ownership in any form. Yet, he continued, "when the electric industry began to build nuclear power plants and had to have insurance coverage, the insurance industry did not wish to undertake this potential risk. Both the electric industry and the insurance industry turned to the government for adequate insurance coverage, in a manner that appears to be the exact reversal of their previous positions."

Here's what the various committee reports had to say:

Rates of Public Utilities—More inflation definitely appears in the offing. With business recession waning and an upturn under way, the signs point to inflation picking up speed. To date, increases in public utility rates have lagged behind other increases in cost of living.

A major reflection of the effects of inflation is "the trend toward giving effect to current costs in determination of the rate base." In 1957 this was done in Minnesota and Missouri and reaffirmed in Alabama. An exception was in Maine where the legislature revised the statutes to exclude consideration of reproduction costs. Currently, the committee report said, some degree of consideration is given to these costs in Alabama, Arizona, Delaware, Illinois, Indiana, Iowa, Maryland, Minnesota, Missouri, Montana, New York, North Carolina, Ohio, Pennsylvania, and Texas.

As inflation becomes more of a problem, the committee report indicated that economic depreciation "will be an issue in more rate cases."

Regarding accelerated depreciation, the report stated that although not all of the commissions have commented on this subject, some 15 states permit use of normalized taxes and nine have used taxes actually paid. To date 24 state commissions have ruled in rate cases where accelerated depreciation has been a factor.

Nuclear Energy in the Electric Industry—The principal area, the committee report said, "in which

These Officers Will Guide NARUC Next Year

CONLEY LEIBRAND McWHORTER

New officers of the NARUC include President John B. Conley, Pennsylvania Public Utility Commission; First VP Leroy W. Leibrand, New Mexico Public Service Commission; and Second VP Matt L. McWhorter, Georgia Public Service Commission.

problems appear likely to develop more rapidly than specific and effective means for handling them are established, is that of the hazards to health arising from the rapidly expanding use of radioactive isotopes."

Progress in Regulation — The committee fears regulation "has lost some ground in the areas of rate base determination." Some courts and legislatures have opened cracks in what had become rather standard rate based determination procedures (original cost and/or actual prudently invested capital rate bases, by requiring consideration being given to present values and reproduction cost). This throws rate making further into that old morass of the "fair value guessing game" in which everything that is done "is based upon judgment and the utility common stockholder usually gets a windfall at the expense of the rate payer."

Valuation—In considering attrition in a rate case, the committee reported, the base period probably could best be handled by a study of plant investment history of the utility involved. Answers to a questionnaire to state commissions, FPC, and FCC showed that the commissions in 24 states use original cost or net investment in arriving at a rate base. Six utilized the year-end rate base, while 18 used either the average for the year or did not indicate. Six used a fair value rate base. In Delaware, fair value is reached by considering both original cost depreciated and current cost depreciated. The remaining five did not reflect their method of attaining fair value.

Ohio was the only instance of the use of reproduction cost new, less existing depreciation, rate base method. New Mexico alone indicated use of book value less historical depreciation.

A majority of commissions have considered the matter of attrition as a specific item in the rate making process. Connecticut, Maine, Massachusetts, Pennsylvania, and Vermont rejected the theory of attrition as a separate item. The remaining commissions considering attrition gave some effect to it.

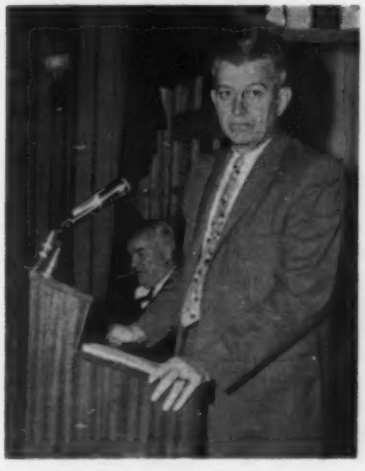
Engineering — A subcommittee studying "electric meter testing" said it is too early to recommend any plan or whether to take a stand for or against use of sampling plans.

'Gov't Power a Threat': Corette

EEI president, speaking at PIP meeting, urges utilitymen to educate the public on the threat to individual freedom that comes with increasing government incursion in business

Edison Electric Institute President J. E. Corette recently expressed "grave concern" about the increasing role of government in business generally, and the power business in particular, and urged utilitymen to come up with a new program to combat it.

Speaking before the annual Electric Companies Public Information Program Workshop Conference in Minneapolis, the Montana Power Co president used his impressions of the starkness of East Berlin under communism vs the bright lights and prosperity of West Berlin under free enterprise to drive home his concern about two trends in the U. S.:



CORETTE: Concerned about government interference in business and the future of American individual freedoms

Two Disconcerting Trends

- The growth of government ownership of American business and the growth of tax-free business.
- The forces and methods increasingly being used to threaten the liberty, freedom and rewards for enterprise now enjoyed in America.

Corette detailed these trends. In 1948, he said, government corporations had assets of $24 billion. Today, some 70 of these corporations have assets totalling $89.8 billions, or about 2½ times the total private utility plant investment in the U. S. Cooperatives, also, are a threat, Corette says, principally because of their tax-free advantages. In the electric business they have gone far beyond their original purpose of bringing power to farms that did not have central-station service. They are moving into urban areas and using their tax-free rates to take away industrial business from private companies whose rates must include large tax payments. EEI estimates that tax free government power plants and REA co-ops account for a tax deficiency of $1.6 billion.

Calls for New Program

Calling on PIP and other organizations which "have day-to-day contact with people outside the utility industry," Corette urged them to use their ability and energies "to keep America from going off the track." He urged an immediate educational program designed to present to the American public the basic facts about our economic system, the concept of limited government, the effects of government waste, extravagance and high taxes. He urged also a program for businessmen to recognize the danger and do something about it.

Other speakers at the PIP Workshop were Utah P&L president E. M. Naughton, chairman of PIP, who spoke along very much the same lines as Corette. Said Naughton very early in the PIP meeting: "I need not tell this to you public relations experts . . . how we may improve our standing with the public —that broad group whose favor or disfavor we know we can determine whether free enterprise in the electric industry will survive . . . The very existence of PIP testifies to the importance we now attach to public opinion. As the public relations arm of our industry, PIP represents all of us, whether members or not, with the influential media of mass communications reaching into every home."

EEI Unveils National All-Electric Plan

Long-awaited, it is called 'National Electrical Living Program' and aims at boosting appliance, wiring, lighting and kwhr sales. Cost for '59: $2.5 million; 126 utilities back it

Edison Electric Institute took the wraps off its long-awaited all-electric living program at a New York press conference last week.

Called the "National Electrical Living Program" (NELP), its $2.5-million will be spent on one basic objective: To sell more electric appliances, more wiring and more lighting (and hence more kwhrs) in American homes. As Detroit Edison VP E. O. George, one of the driving forces behind the program since its conception, puts it: "The opportunity—and the profits—belong to those of you who will make all kinds of electrical equipment; those who distribute it; those who sell it, install it, and service it—and most assuredly to those who provide the power for it . . . This long range program will put more dollars in your cash registers by focusing more attention on the tremendous benefits electricity brings to modern living as compared to other forms of energy and fuel." NELP is backed by 126 companies, about a third of which are combination.

To attain this principal objective, NELP has been divided into three parts or phases:

1. An "Appliance and Medallion Home" program which is aimed at upping the sales of electric appliances (and therefore electric living) in both the new and existing home markets.

2. An amplification of the HOUSEPOWER program to push more wiring capacity in the American home market.

3. A national "Light for Living" program designed to sell more lamps and lighting fixtures to new and existing homes.

In talking about all three phases, Duquesne Light Co VP George Ousler, another EEI spokesman, points to two considerations, namely:

- That the entire program is closely interwoven with the Live Better Electrically program, particularly the appliance and Medallion Home phase.
- That the new program is one of national leadership, and although an invaluable aid to what utilities plan to promote locally, it must be backed up by those local programs if it is to be a success.

GEORGE: 'More dollars in cash register'

Looking at these three phases individually, and in more detail . . .

Appliance and Medallion Home will plug to create the all-electric "climate" in the customer's mind. Then it will push the advantages of electric products in that climate. Finally, it will create a series of basic selling events throughout the year to which utilities can tie their local promotions, and manufacturers tie their national (or local) products.

Housewife Is Target

With women controlling some 85% of all store purchases, this part of the NELP concentrates on them. Specifically, the housewife is the target because it is she who decides what will be bought. The logical medium for this kind of market is daytime network television . . . and this is what will be used. EEI's plan calls for 32 weeks of three different 15-min shows, one day each week. This, according to marketing men, is equivalent to 352 million sales calls.

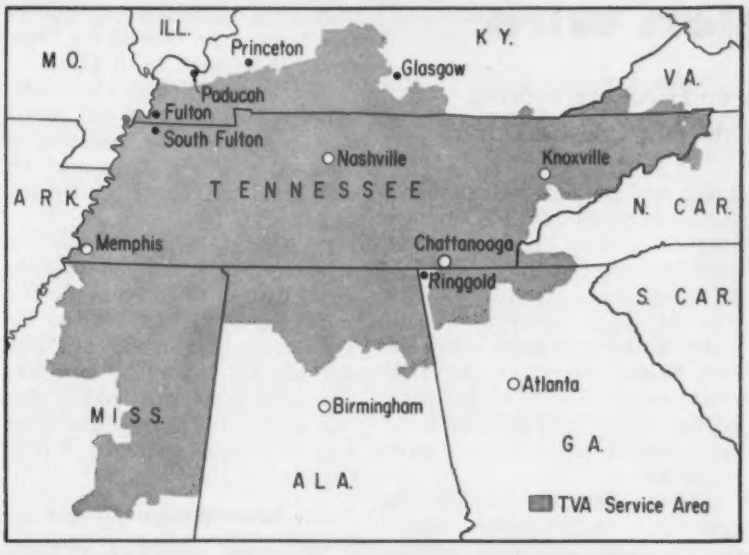
These millions of sales TV messages are not the end of the story, however. They will, in turn, be backed up with quarterly full-color spreads in several national magazines to sell modernity, benefits, and finally, promote the "selling event" for local dealers.

HOUSEPOWER will continue and amplify its program during 1959. This also will be done with magazine ads. Contractors will be wooed particularly with Spring and Fall promotions. National Wiring Bureau will back the EEI wiring push by supplying electrical contractors with coordinated promotion tools. Fall wiring promotions will be kicked off with national magazine ads. They tend more toward product (not brand) promotion of wiring devices (weatherproof outlets, automatic dimmers, strip outlets, etc.)—that consumers do not know where to buy. Idea is to make some of these see-able items prestige objects, thereby making them status symbols for their owners.

Light for Living will be aimed at bringing more people into stores and at selling more and better lighting in homes. To do this, EEI plans three contests, one for student architects, another for adults, and a final one for teenagers. The student architects will design "Light for Living Medallion Homes". The best of these in four regions—Northeast, Southeast, West and Far West—will be the winners for which suitable prizes will be awarded.

The adult and teenager contests will dovetail with the architectural one. The adult will be a multiple choice one in which the contestant after looking at a winning home, will choose the answers which best describes the home's lighting needs. In the teenager contest, not to be run through the schools, contestants will compare the lighting in their own homes in homes of two friends after obtaining and reading a "Light for Living" booklet from their local dealer. Finally, they must write an essay, ad, radio or TV commercial which sells residential lighting. Appropriate prizes, such as scholarships, will be awarded.

EEI emphasizes that NELP is definitely a continuing program.



Kentucky, Georgia companies hope to counter . . .

Turn-About on TVA's Fringe

Georgia Power Co and Kentucky Utilities Co last week were planning moves to counter the shift of five towns from private to public power.

With most of the verbal endorsement coming from local politicians, the turn-about proposals to buy the companies' facilities include charges that present rates are scaring industry away.

The companies' defensive maneuvers include negotiations and the hope by KU of congressional action in the next session to deny TVA access.

In Georgia, the town of Ringgold has taken to the local press its aim to buy out Georgia Power's local facilities. The company is meeting the pressure with a steadfast "nothing doing."

KU's Problem Is Complex

Kentucky's Utilities' problem is more complex. In South Fulton, Tenn., (pop. 2,119) the company's franchise has expired. Town officials want to tie in with the nearby Weakley County system, a wholesaler of TVA power. A franchise has already been granted to the Weakley system.

In a Nov. 27 letter, Weakley system officials informed KU they wanted to negotiate the purchase of KU's South Fulton properties. The letter added that if the company didn't negotiate within ten days Weakley would begin duplicating facilities in the city. A KU spokesman last week said the company would begin dealings soon.

KU's Kentucky problems are most advanced in Glasgow, (pop. 7,028). Glasgow and KU appraisers have been going over the company's system for six months, but no conclusive sale or price agreement has been reached. KU's franchise there expired in 1936 and has not been renewed.

Princeton, Ky., appraisers have been at work for two weeks. So far, no KU appraisers have entered the picture. The city franchise expires in 1960.

In Paducah, where franchise expiration also comes in 1960, officials have penned KU an initial letter announcing an intent to acquire the company's distribution system.

Kentucky Utilities' officials do not feel the flurry of purchase proposals indicates a banding together of towns. South Fulton and Paducah are getting legal counsel from the same man, Joseph Swidler, former TVA general counsel. His private practice since leaving TVA in 1954 includes representing South Fulton in a KU rate increase bid.

TVA itself apparently is not actively backing the moves against KU. Some municipal officials have written the agency, but have received no definite answer from TVA.

Oldham Answers 'Stall' Charge

A recent upsurge in publicity on the Ringgold situation includes the mayor's charge that Georgia Power Co was "stalling" on negotiations with city officials and that rates are too high. H. M. Oldham, company vp, replied in an open letter: "We cannot break down the uniform state-wide rate policy of the Georgia Public Service Commission by giving Ringgold advantages not enjoyed by other towns. These rates are prescribed by the town and are fair and reasonable."

Stressing willingness to come to an agreement with the mayor, M. F. Partin, the letter said, "We are ready to meet with you at any time to see if the merits and fairness of our position can be understood by city officials."

Mayor Partin told EW a referendum two years ago gave the Ringgold council permission to "press for cheaper power." Georgia Power Co representatives have declined to lower rates or accept the council's price offer of up to $200 per meter for the 600-meter system, he said.

On the advice of G. O. Wessenauer, TVA power operations manager, Mayor Partin took up the problem with the North Georgia Electric Co-op. Officials of the co-op "promised us cooperation if we can get rid of Georgia Power, Partin said.

Swiss Firm Lands TVA Order for 3 Generators

Contract for three 60,000-kva water wheel generators for TVA's Wilson Dam, subject of a recent protest by Allis-Chalmers Mfg Co's officials before TVA's board, has been awarded to Brown Boveri Corp. The Swiss company's evaluated firm bid was $2,637,135 including import duty of $310,000, it was reported.

Among three foreign and three domestic companies submitting bids, the lowest domestic offer was by Allis-Chalmers for $4,290,000 on an unevaluated basis; approximately $3,940,000 on an evaluated basis, TVA said.

The Washington Wire

- **Early postponement foreseen on ECAP tax hearing**
- **Morse won't say 'uncle' on high Hells Canyon Dam**

A deadlock on issues probably will again delay the Federal Power Commission's hearing on how 76 utilities accounted for contributions to a 1957 Electric Companies Advertising Program series.

The FPC last August challenged the utilities' tax accounting on nine ECAP ads specifically devoted to the private-vs-public power issue, and called for a hearing to determine whether the ads should be charged to profits—rather than as tax-deductible business expenses. The hearing originally had been scheduled for early October, but was postponed until January 6 to give the utilities an opportunity to prepare their arguments.

Quick Postponement Seen

It appears now that the January hearing will be postponed almost immediately after it convenes in order to permit an appeal to the full commission for a ruling on what the issues in the case are to be.

FPC Staff Counsel Leonard Eesley contends that the only issue is a narrow accounting determination—whether the nine ads under question are related to "a subject of political controversy," and therefore chargeable out of company profits in an appropriate accounting category "below the line" (after taxes are figured).

By contrast, A. J. G. Priest, counsel for 53 of the defendant companies, insists that the utilities have the right to present broader testimony on why they listed their ECAP contributions as reasonable business expenses. He insists that advertising to resist federal power competition is a legitimate and necessary business expense, and an adverse FPC ruling could lead to a court appeal on grounds that the companies' "fundamental principle" of freedom of speech had been impaired.

Priest also has indicated his arguments at the January hearing would include the "reasonableness, propriety and necessity" for advertising against power competition.

Presiding Examiner Edward B. Marsh, in a December 4 pre-hearing conference, outlined these probable developments when the FPC hearing opens in January: **1.** Priest would begin his testimony for the utilities. **2.** Eesley would object to the "extraneous issues" in Priest's testimony. **3.** Marsh probably would uphold Eesley's objection. **4.** Priest would appeal directly to full commission to decide what issues are to be considered. **5.** Marsh would agree to the appeal.

The utilities then would have an opportunity to present their entire case—including individual companies' examples of detrimental federal competition—as part of their arguments that such testimony should be considered in the hearing on the nine ECAP ads. An adverse ruling by the commission could lead to a court appeal.

New Categories Needed

Still another eventual alternative to the companies could be an appeal to the FPC to create a new accounting category for "controversial" ads which are at the same time reasonable business expenses. This would be on the grounds that the present categories are conflicting and invalid.

● Another try in Congress to get enacted a federal "high dam" at Hells Canyon again appears imminent. Sen Wayne Morse dressed the wounds and pumped new life into the rejuvenated National Hells Canyon Association last month in Portland, Ore., and a new bill is now being drafted in Washington, D. C.

Morse Blasts IPC 'Mistakes'

Morse admitted that Idaho Power Co "would have to be compensated" for flooding of Brownlee Dam and "perhaps part of Oxbow," if the high dam is built. He added, however, "It is inconceivable that the public would be charged for the company's mistakes which have taken the (construction) costs much higher than original estimates."

Specifically, he referred to the "mammoth blunder involving the washout of fish facilities and coffer dams at Oxbow this past Labor Day," which he blamed on Idaho Power (EW, Sept. 29, p 47).

"We cannot punish the power company, nor do I seek to." Morse said, and added, the "measure of damages would be a question for negotiation or possibly court determination."

He pointed out also that the cost of condemning Idaho Power's dams would have to be added to the cost of building the high federal dam, but if the benefit-to-cost ratio of the high dam was still "favorable" after condemnation costs were added, then "we must go full steam ahead to get congressional authorization of Hells Canyon."

Public Power Analysis Sought

Morse has asked FPC to determine "actual" expenditures by IPC at Brownlee and Oxbow, and he has asked the Hells Canyon association to analyze the FPC figures to determine what the benefit-cost ratio would be for the high dam.

He outlined one plan, now under study, which might be used to offset the cost of condemning Brownlee—the federal government would operate Brownlee for about ten years, selling power back to Idaho Power at cost plus 3% while the high dam was under construction.

In addition to the Hells Canyon project, Morse again emphasized the need for: **1.** Federal multi-purpose projects at Libby, Nez Perce and Paradise sites. **2.** Federal flood control and power development on "smaller rivers" in Oregon. **3.** Maintenance of existing public preference clauses. **4.** An Oregon state power program "which would market power in accordance with the public preference principle". **5.** General support for Sen. Richard Neuberger's Columbia River Development Corp bill.

● Predictions that President Eisenhower again will recommend private financing for co-ops got added weight early this month. Budget Director Maurice Stans told New York's Union League Club three out of four new users now being added to rural systems are non-farm users. This "startling fact" points to the need for "the reasonable approach" of co-ops seeking private financing, "especially for non-farm purposes."

Atomic Progress

- 'Red tape' investigation of AEC to pressure fund flow
- Bechtel, Ebasco, Stone & Webster get study contracts

The Joint Committee on Atomic Energy is investigating the Atomic Energy Commission's budgeting and contracting processes. Although it's billed as a friendly inquiry, one result will be heightened pressure against any holdback of funds for projects voted by Congress.

Reps. Melvin Price (D-Ill.) and Chet Holifield (D-Calif.) announced last week that their subcommittees have been conducting a staff investigation since August. Areas covered by the inquiry include:

AEC budgeting—The joint committee, which has often protested against hold-back of funds by AEC or the Budget Bureau, wants to know the effects of such hold-backs on contractors and scientists, and how much time AEC scientists and engineers spend on budget matters.

AEC contracting—The committee, noting apparent bottlenecks in getting contracts negotiated, approved and executed, wants to know whether contract negotiation has been overly centralized in Washington, and whether the controller's office exercises veto power.

AEC organization—Answers are sought here on whether policy and decision-making levels are bogged down in details, and if higher salaries cause a drift of too many able field people to AEC headquarters.

The investigation is "not a case of the committee trying to get some ammunition which we'll spring on them later," explains one source.

Still, observers note that there's plenty of room for sharp controversy to develop in the inquiry before the March 1 target date for a report on the investigation.

Past holdbacks of funds for budgetary reasons, for example, is one cause for the investigation. With President Eisenhower now pressuring all executive agencies to hold down spending, it is possible that some of the joint committee's pet projects—say, the plutonium producing reactor scheduled for Hanford—may yet be delayed.

● Winners in the hot competition for contracts to perform studies for the AEC on three power reactor concepts are Stone & Webster Engineering Corp, Ebasco Services, Inc, and Bechtel Corp. Each is associated with a subcontractor.

Thirty-two architect-engineering firms offered 86 proposals in response to the commission's invitation in September.

The concepts, with the firms offering proposals selected by AEC as basis for contract negotiation, are:

Pressurized Water — Stone & Webster, associated with Combustion Engineering, Inc.

Boiling Water — Ebasco, with General Electric as subcontractor.

Organic Cooled—Bechtel, associated with Atomics International.

AEC has not committed itself to build any of the reactors.

International Currents

- Argentina, American & Foreign Power end 10-yr squabble

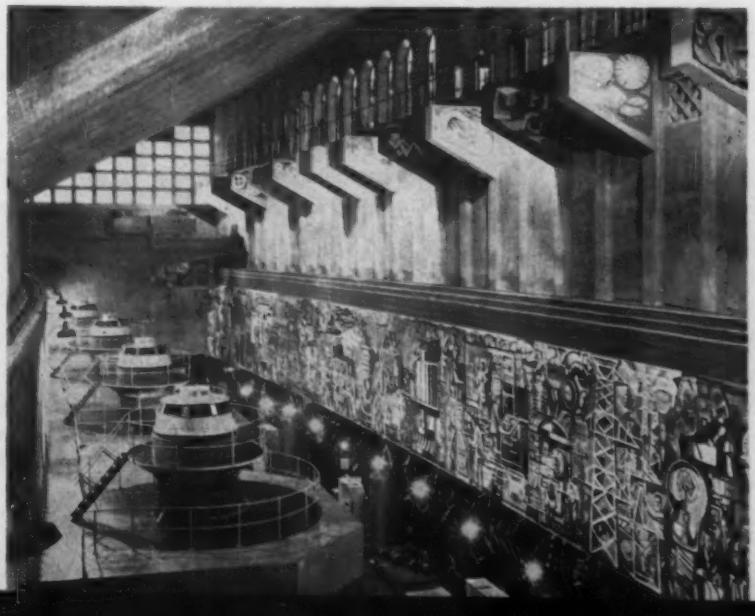
The Argentine government has ended a decade-old squabble with the U. S. American & Foreign Power Co by signing a settlement for properties expropriated under Peron.

A&FP's expropriated properties and all its remaining facilities would be sold to the government, according to the agreement, at a price to be fixed by a Supreme Court justice. The justice will be aided by an advisory group, whose members will be picked by the company, the government and the World Bank.

The company has agreed to reinvest the payment received from the Argentine government in a $62-million, 300-Mw power plant, providing the government's minimum price at least equals the plant's cost. Plant output will be sold to the government.

Spain Acclaims Engineering, Aesthetics

The Salto de Salime hydro project, an $18-million undertaking of two Spanish power companies, has won acclaim for both artistic and engineering skills. The power house scene below shows the aesthetic side. The outstanding feature, though, is the location of the power gallery facility under a humped ski jump and, also, the use of the arch gravity project to bridge a road running along the crest of the structure. Outer walls are slanted—5% in the upstream face and 72% downstream—to hold back water.



Modern coal processing plant can feed . . .

Clinch River plant 30,000 tons/day as . . .

$150-Million Complex Goes on Line

Electric power, railroad, and coal companies integrate facilities, with focus at new 450-Mw plant in Virginia

An electric utility, a railroad, and a coal company have interwoven their facilities in a $150-million scheme to supply electric power locally to southwestern Virginia and to the American Electric Power Co's seven-state system generally.

Focus of the integration is the new 450-Mw Clinch River Plant near Carbo, Va., built by the AEP subsidiary, Appalachian Power Co. This $60-million addition to Appalachian's five major steam plants, begun in mid-1956, has been in initial operation since October. It brings Appalachian's plant generating capability to over 2,000 Mw.

New Mine to Supply Coal

Under provisions of a long-term contract with the utility, the Clinchfield Coal Co, subsidiary of the Pittston Co, has opened a new mine, Moss No. 3, a short distance from the power plant. From the mine, the Norfolk & Western Railway transports coal daily to the 10-acre reserve pile near the plant. The pile has a 350,000-ton capacity.

At Clinch River only one unit of the 450-Mw plant is now in service; the second 225-Mw unit is due for service before the year's end. Electricity is produced at 15.5 kv and stepped up by transformers to 138 kv for transmission.

Coal pulverized to face-powder fineness is fed into two outdoor-type boilers, each about ten stories high. The boilers produce steam at 2,000 psi and 1,050F. Power flows from the generators, through a switchyard on the 105-acre site, to three 138-kv transmission lines. Through its ties, Clinch River Plant is part of the largest integrated electric system in the country, the American Electric Power Co system, which serves areas between Michigan and the North Carolina border.

Clinchfield's new Moss No. 3 mines at Cane Creek will yield about 3,000,000 tons of coal a year initially. This is about 15,000 tons a day. Daily production is expected to double eventually. The new coal preparation plant at Dump's Creek, near Hurricane Junction, sizes, washes, dries, and separates into grades some 1,500 tons of raw coal an hour.

To bring coal to the power plant, Norfork & Western built 31.5 miles of track, two new branch lines, Dump's Creek and Wilder Spur, being now completed. Norfolk & Western's construction includes the 1½-mile Sandy Ridge Tunnel, longest on the railroad's six-state system. The tunnel, although not entirely finished, has been in use since mid-July. The railroad company has enlarged other tunnels also and has a new nearly completed CTC signal system on the main line of the Clinch Valley division.

At the recent inaugural ceremonies, Stuart T. Saunders, Norfolk & Western president, said that the integrated coal mine, power plant, and railroad facilities would employ more than 700 and would have a payroll in excess of $4,333,000 a year in the southwestern Virginia region alone.

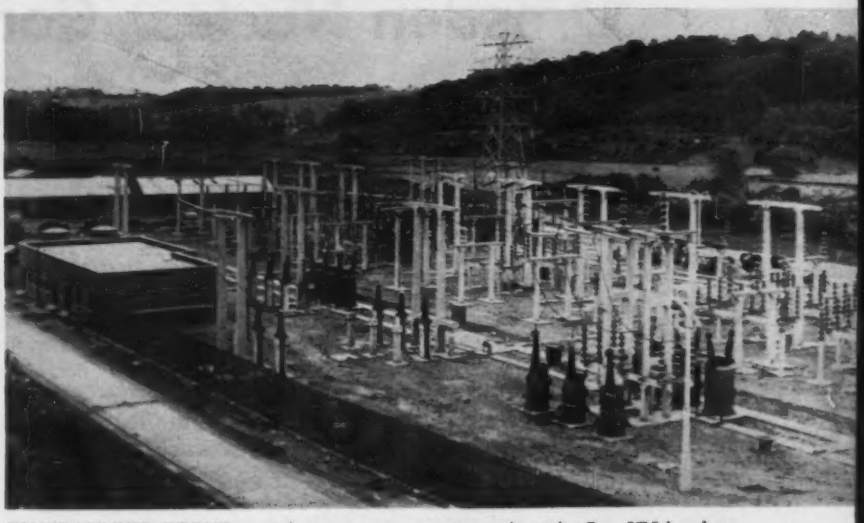
These developments, he said, are "in addition to the new industry which should thus be attracted."

Railroads Warned

The mine-mouth plant would be a warning to railroads that "as coal freight rates go up, electricity can be transmitted by high-voltage wires more economically greater distances," said Joseph P. Routh, Pittston Co chairman. Railroads will "have to meet this situation realistically" with contract or special trainload rates for guaranteed tonnages. Utilities, meanwhile, should place long-term contracts with producers who have large reserves so that they can get financing for construction and ample future supplies, he said.

British Use Concrete Substations

Experience shows concrete costs less for standardized 132-kv, 275-kv structures



STANDARDIZED FORMS may be precast or cast on the job. For 275-kv, however, precasting is required because the longer members need better support

JOHN SHINN, McGraw-Hill World News, London

England's nationalized power utility after 10 years' experience has shifted almost exclusively to standard reinforced concrete substation structures. The trend started in 1948 when steel was hard to get. Now it is being used in virtually all substations.

Designs have been simplified to 12 standard designs for 132-kv substations and 14 for substations of the 275-kv Supergrid. While conceding that cost comparisons are difficult, the British Central Electricity Generating Board estimates that

1. Reinforced concrete generally costs 10 to 20% less than steel.

2. Over a 15-yr period, maintenance costs would be nil for concrete, even in areas with a severe corrosion problem.

Configurations are kept as slender as possible for required strengths, both for reasons of economy and appearance. Mild steel reinforcement is used for most structures, but some high-tensile steel is used for portions of taller structures. C.E.G.B. feels a practical limit of 50-60 ft exists for reinforced concrete structures, so concrete is not used for transmission lines.

Precasting is required for 275-kv structures, because the longer, more slender structural members need the better control over quality of concrete and placement of reinforcement which precasting permits. Precasting of 132-kv structures is optional with the contractor.

Prestressed concrete has been investigated, but it is not considered practical at this time. Some substations are in fairly remote areas with only small contractors available locally. These smaller contractors can handle reinforced concrete but lack experience with prestressed construction.

Investigation continues in the use of fly ash as a partial substitute for cement. Results to date have been promising.

Other possibilities are under consideration, although most construction will continue to use reinforced concrete. Steel welded structures and tubular steel frames may be tested. Shapes are likely to be similar to concrete sheeting.

CONCRETE STRUCTURES support 275-kv buses at a Central Electricity Generating Board substation. Engineers find quality control easier than with steel

Dresden Nuclear Container Sphere

Pressure-differential leak rate method proves vessel's tightness and allows early resumption of in-sphere construction

T. H. SMITH, Project Engineer, Bechtel Corp, San Francisco, Calif.

J. T. DUNN, Contracting Engineer, Chicago Bridge & Iron Co, Chicago, Ill.

J. E. LOVE, Project Engineer, General Electric Co, Atomic Power Equipment Department, San Jose, Calif.

Pressure tightness of a 190-ft dia steel sphere nuclear containment vessel has been checked by measuring differential pressure change between the sphere and internally mounted reference vessels of known pressure tightness. This test realized economies over former ones.

This method, by eliminating measurement inaccuracies caused by temperature change of large gas volumes, permitted an actual leak-rate check in 30 hr. Former tests took up to one week for the same accuracy. After 30 hr in-sphere construction could proceed expeditiously.

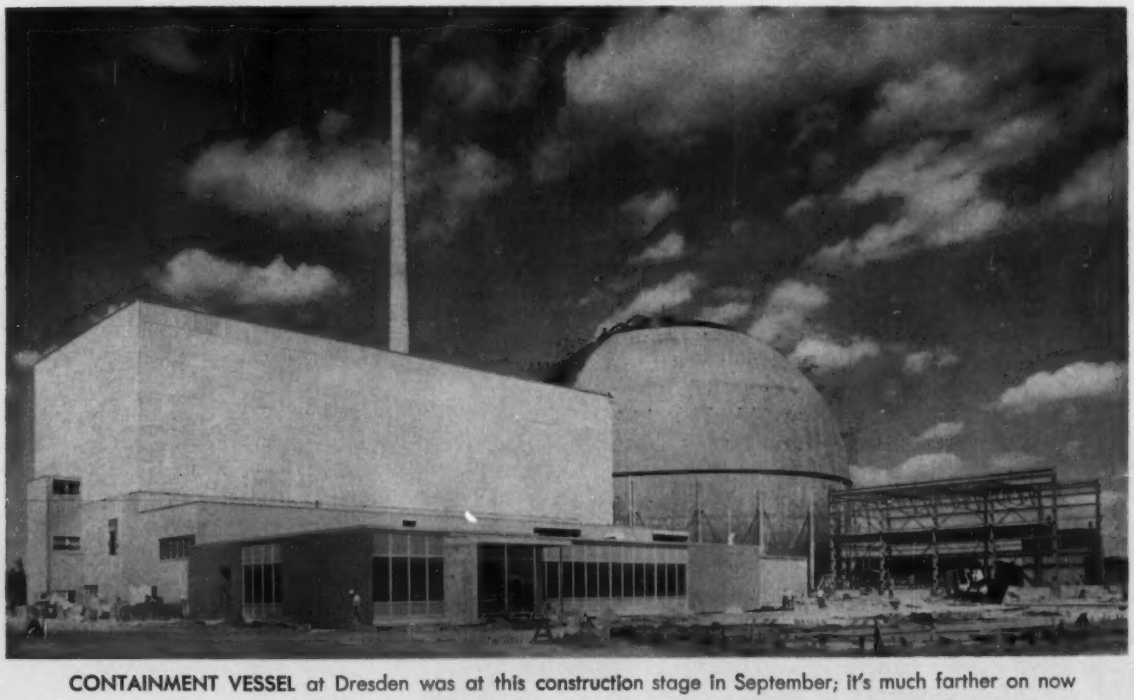
The 3.6-million cu ft sphere will contain the dual-cycle boiling water reactor and four secondary steam generators of Commonwealth Edison Co's 180-Mw Dresden nuclear power station. Dresden is being built by General Electric Co for Commonwealth Edison near the Dresden Lock and Dam about 50 miles southwest of Chicago. Bechtel Corp is engineer-constructor to GE for plant construction. Chicago Bridge & Iron Co engineered and built the sphere.

About 20% of the sphere's volume will be displaced by equipment, supports, shielding, and auxiliaries. The sphere's purpose is to contain, without detrimental leakage, all products resulting from a serious accident, thus preventing radioactive material escaping to the outside. Hence scrupulous attention to avoid leaks and a careful leak-testing procedure are essential.

Selection of a steel sphere for the Dresden containment vessel was predicated on cost, its adaptability to testing for and repair of leaks, and overall satisfactory performance.

The vessel's 29.5-psig design pressure more than satisfies the estimated containment duty corresponding to the "probably worst" accident—one producing a pressure probably not exceeded by any resulting from an accident. Source of the pressure could be release of steam into the containment vessel in event of rupture of the reactor pressure vessel itself, or rupture of steam or water piping. It must be assumed that this steam would be radioactively contaminated by fuel-element rupture.

Furthermore, the vessel's 37.0-psig overload proof-test pressure (1.25 x design pressure) would contain adequately the pressure-time-volume duty of the "worst reasonable accident"—the worst accident having reasonable possibility of occurrence. Despite its extreme improbability, such an accident must be recognized in a conservative design. The concept depends on almost impossible simultaneous mal-



CONTAINMENT VESSEL at Dresden was at this construction stage in September; it's much farther on now

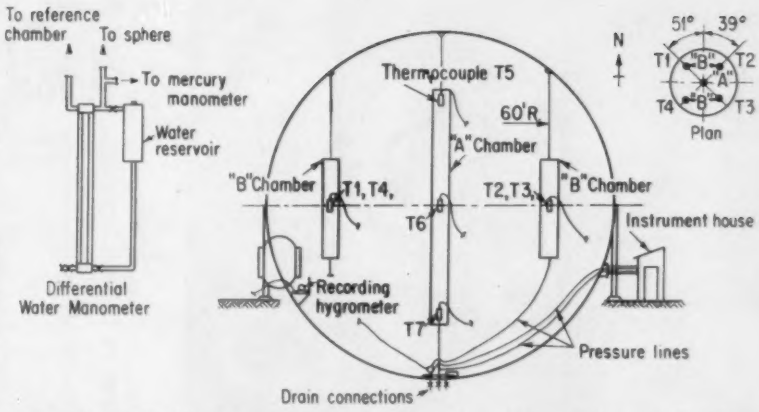
Leak-Tested Economically

function of numerous protective devices coincident with personnel errors.

To meet these conditions, the sphere was built of SA.201 Grade B firebox-quality steel produced to A.300 specifications. Minimum plate thickness is 1.25 in. at the top of the sphere, increased to 1.40 in. at the thickest section. The sphere has personnel and equipment locks, an equipment hatch, and many piping and wiring penetrations.

The traditional method of leak-testing a containment vessel is to pressurize it slightly, apply soapsuds to suspected leakage regions, and watch for bubbles indicating leaks. When all leaks found are stopped, the vessel is brought to the overload test pressure and back down to design pressure. The pumping source is then removed, and the "leak-rate" measured in pressure (or %-pressure) change per unit of time.

The greatest difficulty in determining the leakage rate of a big vessel stems from small internal temperature changes. These cause larger pressure variations than those due to any leaks in a carefully fabricated vessel.



VERTICAL SECTION of Dresden containment sphere shows placement of reference chamber, thermocouples and manometer for pressure-differential leak rate

Thermocouples Used

This difficulty has been overcome by determining average internal gas temperature by means of thermocouples, and correcting pressure readings by applying the general gas law. But obtaining leakage measurements within the required test accuracy for a very large, high-quality vessel requires test periods up to a week. During the period when the structure is under test pressure, in-vessel construction activities must be suspended, making the test highly expensive.

A method was sought for obtaining a test less sensitive to internal temperature variations. This was accomplished first at GE's Vallecitos Boiling Water Reactor Plant. The Vallecitos test was implemented by constructing inside the containment vessel a reference system of interconnected pressure-tight drums, a connection being brought out through the vessel wall to one side of a water manometer; internal vessel pressure was applied from the opposite side.

Thus vessel air and reference system air temperatures varied by substantially equal amounts, and differential pressure measurements between them showed very nearly no effect of the variations. During a few hours at night, when ambient temperature remains nearly constant, the effect of temperature is insignificant.

A similar system was used by Chicago Bridge & Iron Co in testing a containment vessel at Wright-Patterson Air Field.

At Dresden, the basic method was employed with important modifications. Sphere size and high cost of delaying in-sphere construction required firm planning to ensure satisfactory leak-rate determination without long test duration.

Cross-Check Sought

Thus it was decided to:

1. Install two separate reference systems to cross-check possible leakage in either, and to help decide whether conformation or location of reference systems is critical;

2. Pre-test reference system under 25-psig pressure, using a halide detector for finding leaks;

3. Charge reference systems initially with air to 5 cm (water) above sphere air pressure as an added check on reference system tightness, and blow all moisture from reference systems and vessel before the test to ensure moisture partial pressure would not influence measurements.

One reference system was a single 100-ft-long, 12-in. dia "bulb" of 12-gage spiral-welded steel pipe, suspended on the sphere vertical center line from the sphere top. The second reference system included four interconnected 30-ft-long bulbs, spaced at quadrant points around the sphere and centered at the equator. Each system was connected to its own water manometer.

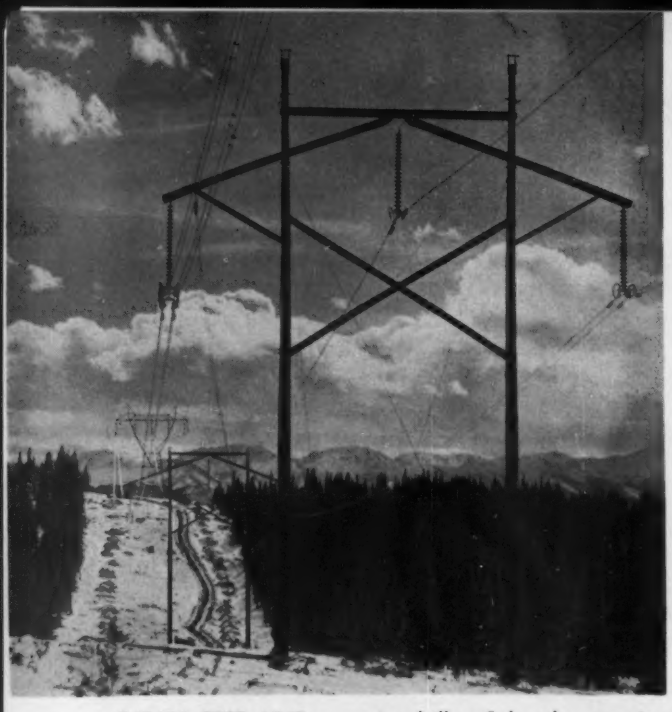
Leaks Found

Thermocouples attached to the reference chambers checked temperatures within the sphere. These thermocouples were shielded against heat radiation from the sphere surface by perforated aluminum tubular shields.

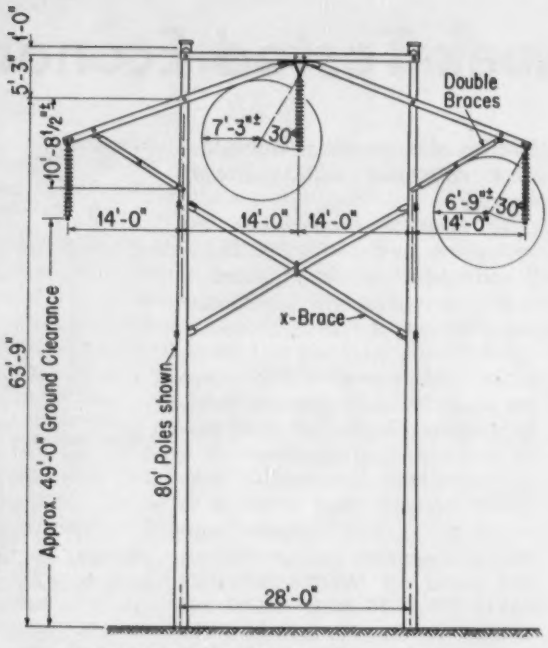
A bank of compressors pressurized the sphere to 5 psig, and suds testing found some minor leaks, all in temporary closures. The leaks were stopped. The system was raised then to 1.25 x design pressure, 37.0 psig (total time for pumping, leak-testing, and repairs was about 82 hr). This pressure was held for 1 hr for the conventional overload pressure test required by ASME Boiler & Pressure Vessel Code for Unfired Pressure Vessels (Section VIII).

The systems then were bled to design pressure, 29.5 psig, and the

(*Continued on page* 94)



345-KV TEST LINE near Leadville, Colorado, carrying bundled conductors, is similar to the 230-kv structure



INCREASED SPACING for higher voltages is only feature of 345-kv lines which is different from 230-kv transmission

230-Kv Line Wood Pole Structures

RALPH G. YERK, Chief Engineer, Hughes Brothers, Seward, Neb.

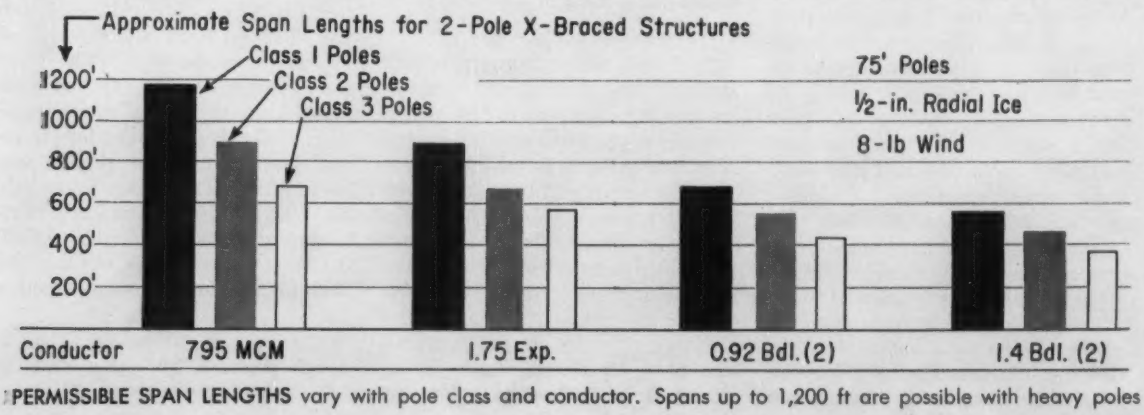
Successful experience with wood pole construction on 230-kv transmission lines and encouraging test results on 345-kv experimental lines have led to increased investigation of possible 345-kv wood pole lines by operating companies.

Experience indicates that designs for 345-kv operation will be similar to the inclined arm designs which have operated successfully at 230 kv. Increased phase spacing and conductor clearances will be provided for 345-kv service.

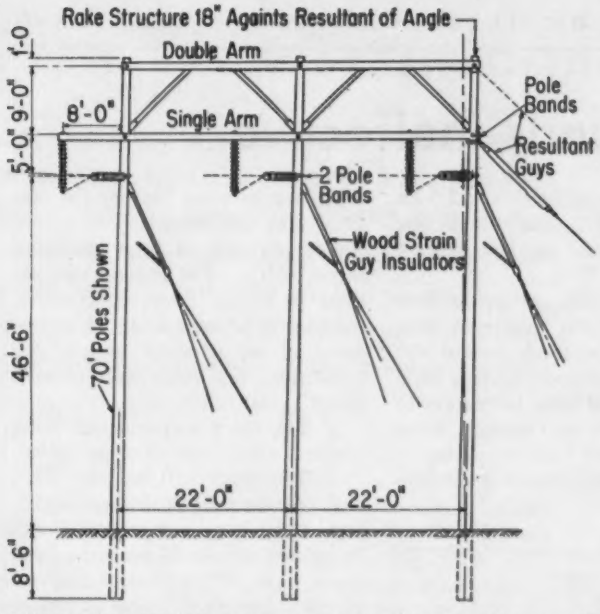
Inclined arm structure designs were developed to use lengths of timbers readily available from existing sources. Lack of availability of large quantities of 40-ft timbers prompted the development of inclined arm design. The shorter timbers also simplify material distribution, particularly in rough country.

Special construction features for use on angles and severe slopes are shown in several of the accompanying illustrations. Modifications will be made as experience dictates.

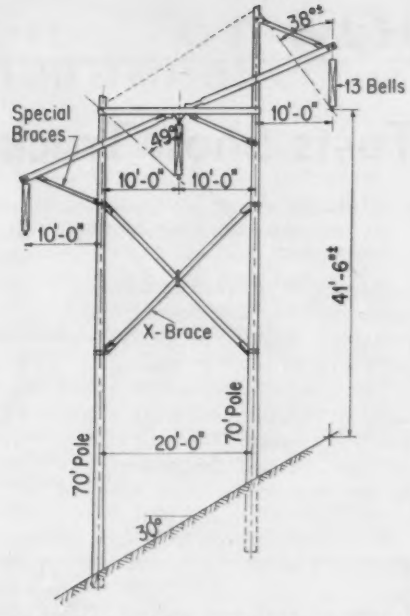
Comparative span lengths permissible with Class 1, 2 and 3 poles vary from less than 400 ft for bundled conductors on Class 3 poles to nearly 1,200 ft for single conductors on Class 1 poles.



PERMISSIBLE SPAN LENGTHS vary with pole class and conductor. Spans up to 1,200 ft are possible with heavy poles

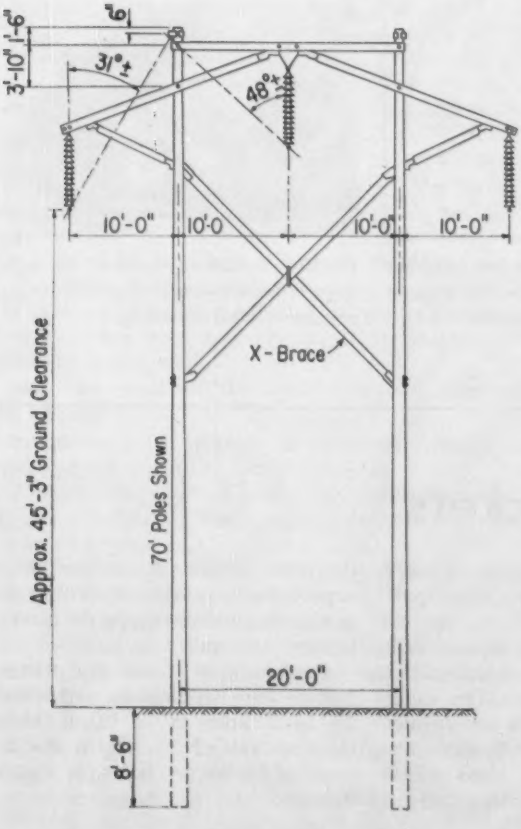


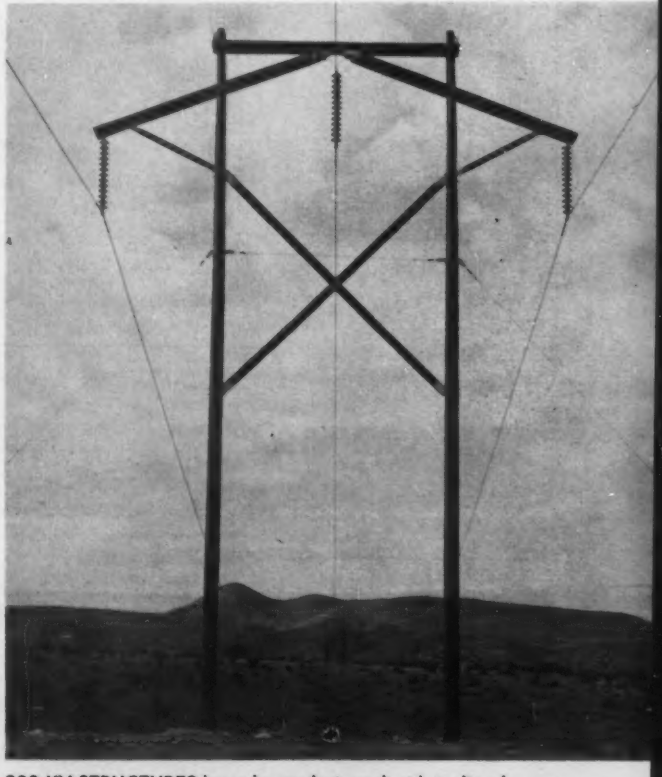
SUSPENSION STRING maintains position of horizontal insulator string in this structure designed for use on light angles



HILLSIDE STRUCTURE with shorter downhill pole is possible with design which reverses one set of inclined cross arms

Feasible for 345 Kv





230-KV STRUCTURES have been designed with inclined arms and have had good operating records in recent years

INCLINED-ARM design for 230-kv structures requires shorter timbers than H-frame designs, easing supply problems

Tests Show Truck Grounds Ineffective

R. W. BECKEN, Construction Superintendent, Otter Tail Power Company, Fergus Falls, Minn.

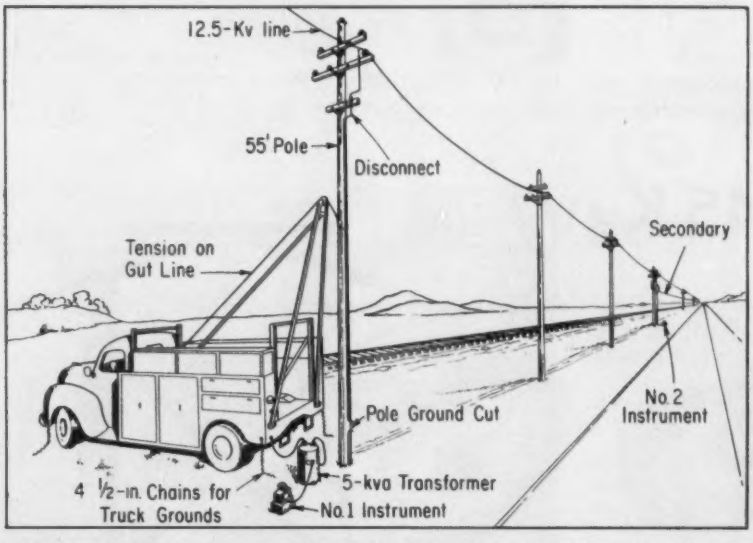
Results of extensive tests conducted by Otter Tail Power Co have prompted changes in safety rules pertaining to truck grounding.

The tests were begun after a fatal accident that occurred when a pole was being pulled. The man guiding the butt touched the ground wire on the pole at the same time the ground wire contacted a 12.5-kv phase conductor. The winch line was not grounded through a truck ground.

Tests conducted at the accident site showed that current flow through a normal truck ground was not enough to depress voltage on a 12.5-kv line and offer protection to workmen or to the public. As a result, new safety rules were made.

The new rules require grounding winch trucks when they or the material they are handling are within contact distance of lines energized above 300 v. The ground consists of a ½-in. or larger link chain. Because it is impossible to be assured of an effective ground for protection, the rules also provide that:

1. The truck and material being handled will be treated as energized.
2. The truck will be barricaded with at least six yellow flags.
3. Poles being set or pulled will be guided with pole tongs or snub ropes when within contact distance of lines energized above 7,500 v. Rubber gloves may be used when line voltage is 7,500 v or below.
4. Ground wires on poles must be cut and rolled back at least 3 ft each way from the point of winch line attachment.



TESTS CONDUCTED simulated conditions at time of fatal accident with different types of truck grounds being used for each series of tests. Instruments showed voltage level at different points. As a result, new rules were established

YELLOW FLAGS are placed on both sides of truck to warn of possible high voltage in area of testing

Drill Jig Helps Adapt Brackets

C. B. ANDERSON, Supervisor, Salvage Shop Section, Long Island Lighting Co, Hicksville, N. Y.

A drill jig having only two moving parts speeds drilling of transformer tank brackets for Long Island Lighting Co. The jig was developed after it was found necessary to drill the brackets of a large number of transformers of an older type to adapt them to a direct pole mounting hanger.

A clamp holds the electric drill on the inner frame, which slides along an outer frame. The outer frame is clamped to the transformer bracket. It is propelled by an easily-adjusted worm gear hand screw located at the back of the drill on the outer frame. A positive stop is provided to prevent the drill from penetrating and damaging the transformer tank wall.

Previously, 45 min per transformer were required to make the 13/16-in. holes in the ½-in. thick steel brackets. Now, only 6 min is required for the two holes per transformer.

Plan Your Transformer Maintenance

The following is adapted from the Substation Maintenance Workshop prepared and conducted by the Industrial Sales Dept of West Penn Power Co for its larger industrial customers. The first article, covering testing of oils and insulation, appeared in the August 25, 1958 issue of EW. A third article covering relay and breaker maintenance, will appear in a later issue.

Transformers are probably the most important single piece of apparatus in an electrical system. Consequently, although they have no moving parts and cause little trouble, a regular preventive maintenance program is essential to assure successful operation of this vital equipment.

All transformers should be inspected periodically, and accurate records kept of all findings to help potential trouble sources and correct them before an outage can occur. These inspections will also help to determine when untanking and overhauling is necessary.

It is recommended that a visual inspection of all transformers be made monthly, as a part of the substation inspection. Of course, the frequency of inspection will be affected by the age of the unit, its past history, type, and the ease with which an inspection can be made. If there are recording charts that must be changed weekly, then the substation should be inspected at the same time. A check list for a visual inspection is given in Table I. Be sure to record all data for comparison with past and future inspections.

A special or complete inspection should be made at any time that circumstances seem to warrant it. For example, if unusual noises develop in a unit, even though it has been recently inspected, this trouble should be investigated.

Here are some of the indications and occasions that require it:

1. An excessive increase in operating temperature without a corresponding increase in load.

2. Abnormally low oil level. This may indicate leaking oil, a dangerous condition, especially in high voltage equipment.

3. Unusual noises, such as electric arcs, oil gurgling, or overly loud magnetic noises.

4. A ruptured relief diaphragm or throwing of oil. This indicates an internal explosion, a dangerous condition which should be investigated immediately. The transformer should be removed from service as soon as possible.

5. Poor test of an oil sample (dielectric below 20 kv).

6. After moving a transformer from one location to another. This is an ideal time to make an inspection, since the transformer is out of service, help is available, and repair parts can be obtained. In addition, some parts may have been damaged during the move.

7. When a transformer which has been de-energized for a long period is about to be put back into service. During the period of idleness, moisture may enter, oil may leak, or bushings may have been broken.

If the transformer appears to be operating normally, the schedule in Table II may be used as a guide in making tests and inspections of substation transformers.

Before the complete inspection is started, the transformer must be completely de-energized. We recommend the following procedure:

1. Obtain a release order from the utility dispatcher or other competent authority. Post tag-out cards at the visible switch openings. The master tag-out card should be the main control for the transformer.

2. Open the low voltage breaker first, then the high

Table I—Monthly Visual Inspection

(Caution: The transformer is energized)

Check loading
Is maximum temperature indicator below 75C? Reset it.
If there are three transformers, do all have the same reading?
Look for oil leaks in gaskets, valves, and gauges.
Check oil level and oil gauge condition
Check for broken porcelain
Check for dents in radiators or other mechanical damage
Check heating of external electrical connections
Check for unusual noises or conditions
Inspect ground connections

Table II—Schedule for Complete Transformer Inspection

Insulation Resistance Tests	
1,000 kva and larger	4 yr
Smaller than 1,000 kva	10 yr
Oil Tests (Units larger than 100 kva)	
Sealed type	2 yr
Open breathing type	1 yr
Chemical Analysis of Oil (Above 100 kva)	5 yr
Nitrogen Gauge and Relief Valve	6 mo
Tap Changer Mechanism	5 yr or 100,000 operations, min.

voltage breaker or air break switch, de-energizing the transformer.

3. Open the disconnects on the breakers. Be sure there is a visible opening on both the high and low voltage sides.

4. If the equipment is rated 2.3 kv or more, use a glow detector to be sure it is dead.

5. Install ground leads.

6. Put release notices on the equipment.

7. If there is other energized equipment nearby, stretch a tape around the released transformer to keep workmen in the safe area. The men then enter and leave the area only through the one exit provided by the tape.

What Inspection Should Cover

A complete inspection includes the procedures in Table I plus those listed below:

1. Check all gaskets. Paint or replace deteriorated ones whenever practical. Remember: the Golden Rule for gasket is, "When in doubt, install a new one."

2. Clean porcelain bushings, using a porcelain cleansing powder. When they are thoroughly clean, inspect closely for fractures, pinholes or chipping, tapping them with a metal object.

3. Check metal parts for corrosion. In oil-filled bushings, check the oil level and look for leaks. Gaskets in compound-filled bushings should be replaced if more than one tablespoon has leaked out.

4. Inspect gap spacing. Be sure settings are correct.

5. Look for evidence of sludge or carbon, especially on the tap changer. Operate the changer a number of times, but be sure it is left in its original position.

6. Smell the oil. Oil that has been subjected to arcing has a noticeably pungent odor.

7. In a breather type unit, the oil can be lowered. Then check all leads and terminals, both inside and out, for good contact and tightness. Look for evidence of heating. All cable leads should be brazed or crimped.

8. Inspect the grounds. A good ground has a clean contact, a large contact area, and is tight.

9. Make sure the breathers are not clogged.

10. Check inert gas system for leaks and add gas if necessary. An unusually high vacuum on the pressure guage indicates a nitrogen leak. Record condition as found and as left. See if the pressure holds after a few days.

11. Make sure radiator tubes are open. This may be easier when the unit is in operation. If the top of the radiator is cold and the bottom is hot, there is no oil circulation.

12. In breather type units, check inside of tank for corrosion or rust.

13. Check paint condition, touching up where needed.

14. Make sure explosion diaphragms will operate if necessary.

Then run a dielectric test on the oil. If it tests less than 20 kv, the cause should be found and corrected.

For sealed type units, a test of oxygen content in the nitrogen should also be made.

Before the transformer is returned to service, a complete set of insulation resistance readings should be made. Check high to ground, low to ground, and high to low, as indicated previously (EW, Aug 25, 1958 page 69). Record all three readings, along with the apparatus temperature and the weather conditions.

After several years of operation, the transformer should be untanked and given an overhaul. The appropriate time may be determined from insulation resistance readings, oil checks, visual inspection reports, and operating experience. Any unit more than 15 years old should be untanked after being moved from one location to another if more than 5 years have passed since the last untanking.

Points To Check During Overhaul

1. First read the instruction book for precautionary information: For example, disconnect thermometers before raising core.

2. As the transformer is lifted out of the tank, flush it down with filtered oil. A paint brush may be used to loosen carbon or other deposits.

3. Make all the checks normally included in a complete inspection.

4. Check the bottom of the tank for moisture, sludge or carbon. This is an indication of the condition of the winding and core. Inspect the underside of the cover for moisture; if moisture is present, the entrance point must be found and repaired before the unit is energized.

5. Make sure oil ducts are open.

6. Re-insulate weak spots in the insulation with Micarta tubing, varnished cambric, or linen tape. For impulse protection, the incoming leads need more insulation than the turns at the center of the winding.

7. Tighten all clamps, leads, bracing, and wedging.

8. If silica gel in breather units is pink, replace it. If there is no oil in it, wet gel can be dried out and reused by placing it in an oven.

9. Make certain the ground wire lug is properly connected and in good repair.

When working on the unit, be careful not to drop any tools into the windings. They are extremely hard to recover and, if left there, may overstress the insulation and cause a failure. Remove loose materials from pockets and tie a tape on wrenches before looking into a manhole or going inside the tank.

Install Good Grounds

For safety reasons, every transformer should have a permanent ground. This will eliminate static electricity and prevent high voltages on the equipment during surges caused by short circuits or lightning. A ground is the workman's best safety device. Before climbing on top of a transformer, the old timer first looks for open disconnects and then for grounds.

The ground must be large enough to carry the phase-to-phase or phase-to-ground short circuit current, at that particular location, for at least one or two seconds. We use a No. 1/0 ground lead at small substations and a No. 4/0 at our 132-kv substations. The tank of each transformer and the arresters, if they are on the transformer frame, should be grounded to the station ground.

One of the main problems in the operation of transformers is loading. Most transformers can be overloaded 100% for short periods of time without permanent damage, especially in cold weather. However, a continuous overload will decrease the life of the unit. A transformer that is cycled—that is, has a large load, then a low load for several hours, then repeats—will depreciate faster than one whose load is steady.

The limiting factor affecting transformer loading is

usually temperature rise. The temperature limit of most transformers is a 55-degree rise, starting from a 40C ambient for the temperature of the surrounding air. Thus 95C is the hottest spot a unit should have, representing the temperature of the hot copper. Since the hot oil temperature is read on a guage at the side of the unit, a 15-deg correction should be allowed. Consequently, 80C is the upper practical limit for a transformer oil temperature reading.

If the oil temperature reaches 70C, someone in authority should be notified so that remedial measures can be taken. If the ambient temperature is below 32F, the load can generally be increased 100%.

When an overload is continuous, additional transformer capacity should be installed. However, there are a number of ways in which temporary overloads may be accommodated:

1. Reduce the load. If there are single-phase loads on a 3-phase circuit, balance them as well as possible.

2. Put fans on the transformer or on the ground nearby. One manufacturer rates their transformers 100% without fans, 125% with fans, and 166% with fans and oil pumps.

3. Clean the surface of the tank. A tank that is covered with oil, grit, or dirt does not radiate as much heat as a clean one and consequently cannot carry as large a load.

4. Spray water on the tanks, being careful not to hit the bushings.

5. Remove any boxes, crates, or other encumbrances from the transformer to permit free circulation of the air around it.

6. Inspect the radiators for oil circulation. If the oil is low, it may not be flowing through the radiators.

7. Install air deflectors to provide a circulation of air past the cooling coils. These can be designed to draw cool air in at the bottom and up past the cooling coils and exhaust the hot air at the top. On one installation, this arrangement cut the transformer temperature by approximately 6%. Mere circulation of hot air does little good.

Observe Safety Precautions

Any discussion of transformers would be incomplete without considering safety. The procedure detailed above for removing a transformer from service should be followed before starting any maintenance work. If there is energized equipment nearby, plywood barriers should be placed between the released equipment and the energized apparatus to prevent workmen from coming into contact with it or accidently touching it with a tool. If workmen are working off the ground, near the energized equipment, a workman should be appointed to see that nobody gets into trouble.

Similarly, if there is more than one transformer bank in an area, place the name on the bank to prevent workmen from getting on a bank that is still in service.

All precautions should be taken to prevent fires. Keep oily rags and oil away from any possible fire and dispose of them before leaving a job. When the transformer lid is first removed, keep all cigarettes and flames away from the entrance. There may be explosive gases inside the tank. When opening a nitrogen-filled unit, be absolutely sure the nitrogen inside the tank is removed and replaced with air before a workman goes inside the tank.

Scores Original-Cost Accounting

Guercken tells N. J. Utilities depreciation is not fully recognized; ad man says IRS action denies companies self-defense

How can the utility industry operate today in accordance with ground rules laid down 20 years ago? This query was posed to the New Jersey Utilities Association at its recent Absecon, N. J., meeting.

"As revenue requirements are generally based on a cost of service concept, all cost must be fully recognized and recovered," said C. P. Guercken, Ebasco Services, Inc. "All costs should be current and not based on a level of historic cost long obsolete. Under the original-cost concept of accounting, a most important element of cost—depreciation—is not fully recognized. Utilities are merely amortizing dollars rather than depreciating property."

In effect, the utilites, Guercken said, are attempting to match the 100¢ dollar of 1939 with the 45¢ dollar of 1956, which is about "as logical as using the fuel or labor costs of two decades ago." Thus, they are recovering only a fraction of the property used up, the percent understatement increasing progressively.

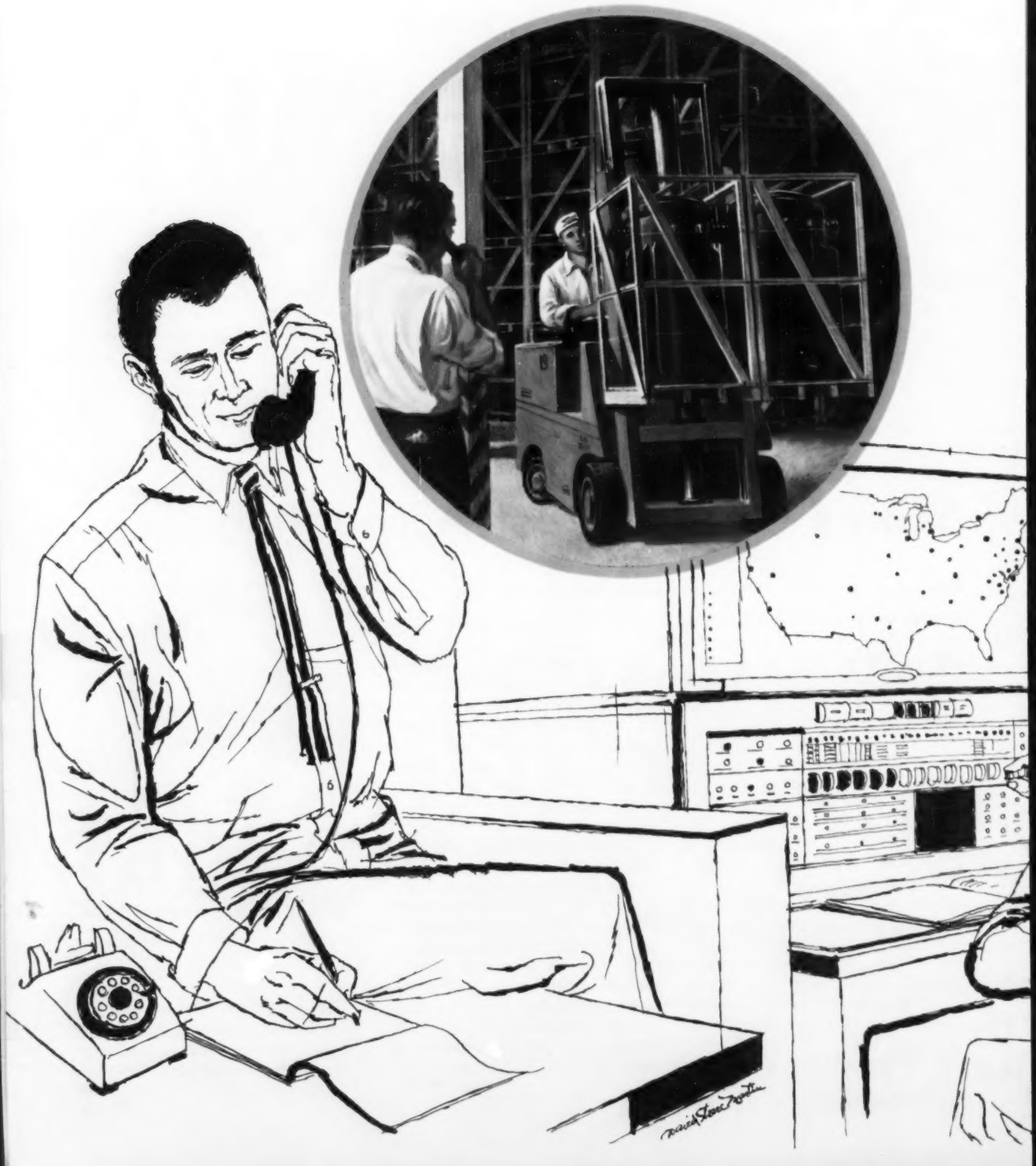
"While in 1937 the understatement of book depreciation below current cost depreciation amounted to 22%, by 1956 it had doubled to 44%, and there is reason to believe that an understatement approaching 48% will be shown for 1958," Guercken said. "And while the book reserve deficiency compared to the reserve requirement in 1937 amounted to 38%, by 1956 it had increased to 63%."

GUERCKEN: "Historic cost obsolete"

Conceding that old plant is not replaced today by like, but rather by larger, plant. Guercken dis-

(*Continued on page* 94)

Before you buy another



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Before you buy another distribution transformer, check service—give your transformer manufacturer credit for the extra values he gives you. General Electric Company, Schenectady 5, New York.

431-79

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GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU

		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

Lighting Levels for Industrial Areas—I‡

Table lists recommended levels of illumination for specific eye tasks in various industrial areas. These data are adapted from the foot-candle tables issued recently by the Illuminating Engineering Society.

AIRPLANE MANUFACTURING	Ft-c*
Stock parts	
Production	100
Inspection	200**
Parts manufacturing	
Drilling, riveting and screw fastening	70
Spray booths	100
Sheet aluminum layout and template work; shaping and smoothing of small parts for fuselage; wing sections, cowling etc.	100
Welding	
General illumination	50
Supplementary illumination	1,000
Subassembly	
Landing gear, fuselage, wing sections, cowling and other large units	100
Final assembly	
Placing of motors, propellers, wing sections and landing gear	100
Inspection of assembled ship and its equipment	100
Machine tool repairs	100

ASSEMBLY	
Rough easy seeing	30
Rough difficult seeing	50
Medium	100
Fine	500
Extra Fine	1,000

AUTOMOBILE MANUFACTURING	
Frame assembly	50
Chassis assembly line	100
Final assembly and inspection line	200**
Body manufacturing	
Parts	70
Assembly	100
Finishing and inspecting	200**

CHEMICAL WORKS	
Hand furnaces, boiling tanks, stationary driers, stationary and gravity crystallizers	30
Mechanical furnaces, generators and stills, mechanical driers, evaporators, filtration, mechanical crystallizers, bleaching	30
Tanks for cooking, extractors, percolators, nitrators, electrolytic cells	30

CLAY PRODUCTS AND CEMENTS	Ft-c*
Grinding, filter presses, kiln rooms	30
Molding, pressing, cleaning and trimming	30
Enameling	100
Color and glazing—rough work	100
Color and glazing—fine work	300**

COAL TIPPLES AND CLEANING PLANTS	
Breaking, screening and cleaning areas	10
Picking	300**

ELECTRICAL EQUIPMENT MANUFACTURING	
Impregnating	50
Insulating: coil winding	100
Testing	100

EXTERIOR AREAS	
Entrances	
Active (pedestrian and/or conveyance)	5.0
Inactive (normally locked, infrequently used)	1.0
Vital locations or structures	5.0
Building surrounds	1.0
Active shipping area surrounds	5.0
Storage areas—active	20
Storage areas—inactive	1
Loading and unloading platforms	20

FLOUR MILLS	
Rolling	50
Sifting	50
Purifying	50
Packing	30
Product control	100
Cleaning screens, man lifts, aisleways and walkways, bin checking	30

MACHINE SHOPS	
Rough bench and machine work	50
Medium bench and machine work, ordinary automatic machines, rough grinding, medium buffing and polishing	100
Fine bench and machine work, fine automatic machines, rough grinding, medium buffing and polishing	500**
Extra fine bench and machine work, grinding—fine work	1,000**

* Minimum on the task at any time.

** Obtained with a combination of general lighting plus specialized supplementary lighting. Care should be taken to keep within the recommended brightness ratios. As far as possible the installation should eliminate direct and reflected glare as well as objectionable shadows.

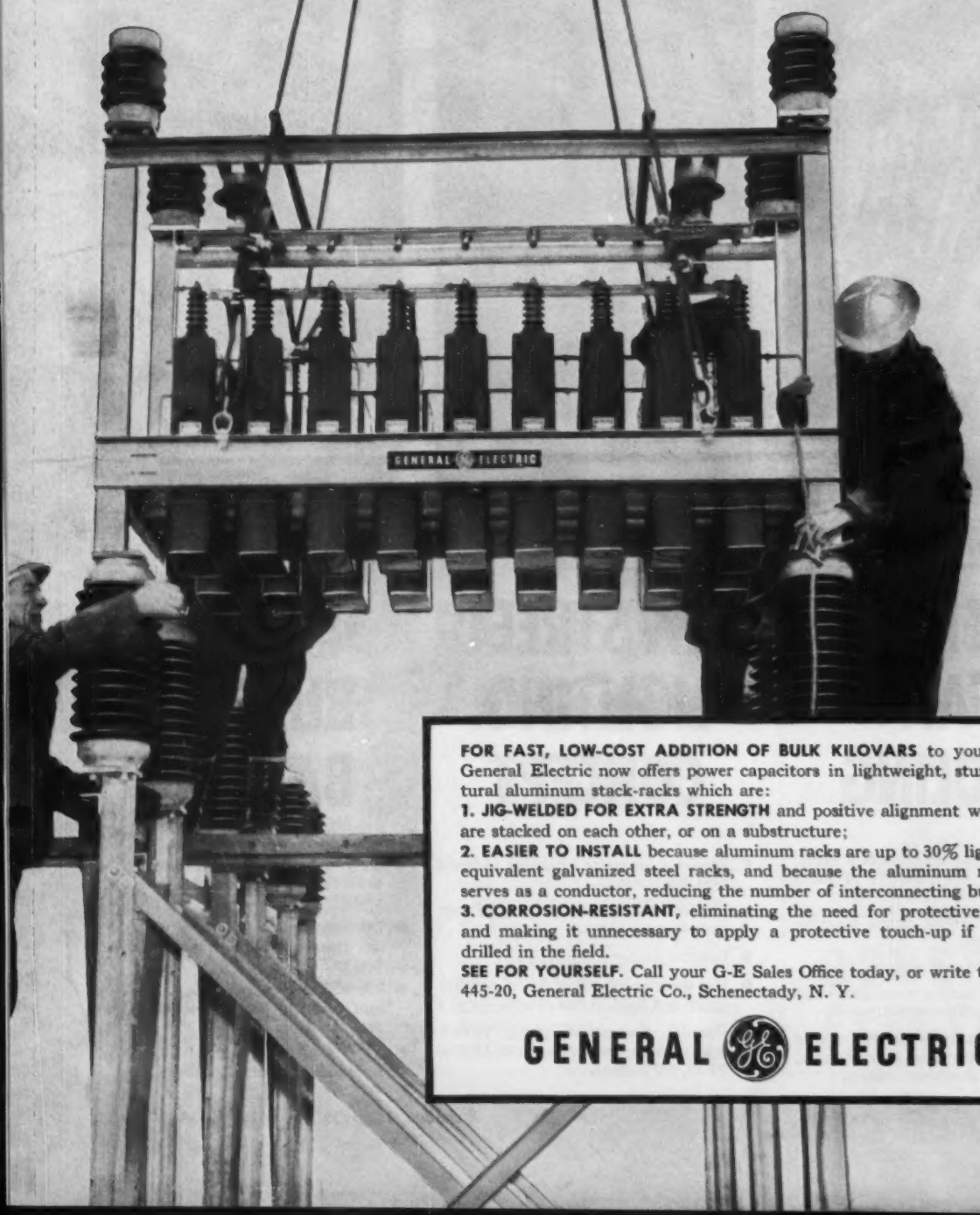
† Or not less than 1/5 level in adjacent areas.

‡ Additional industrial areas with recommended lighting levels will be listed in Electrical World, Dec. 29.

ANOTHER GENERAL ELECTRIC ***Kilovar Plus . . .***

LOWER INSTALLATION AND MAINTENANCE COSTS WITH . . .

New Aluminum Stack-rack Capacitor Equipments



FOR FAST, LOW-COST ADDITION OF BULK KILOVARS to your system, General Electric now offers power capacitors in lightweight, sturdy structural aluminum stack-racks which are:

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EXTRA VALUES

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FORM 406
FLUORESCENT LUMINAIRE

INTERNAL FAN COOLING

- Air-circulation system—a G-E exclusive—boosts light output of luminaire up to 25%.
- Four Power Groove lamps generate 37,200 lumens.
- No increase in unit cost.
- Completely factory-assembled and tested; shipped in ***single*** carton.
- Ideal for business streets, traffic arteries, expressways, interchanges, parking lots, shopping centers.

2

"TEE-LIGHTING"
FLUORESCENT SYSTEM

NEW STREET-LIGHTING CONCEPT

- Ideal for "prestige" lighting of business whiteways.
- Highest utilization efficiency of any fluorescent system.
- Greater driver comfort.
- Uni-directional reflectors in parallel units aim light across street.
- Parallel fluorescent units, 18,600 lumens each; transverse unit, 18,600 to 55,800 lumens.

3

"POWER PACK"
MERCURY LUMINAIRE

NEW BUILT-IN BALLAST

- Only two terminal connections—saves up to 30 minutes per unit installation.
- Eliminates need for ballast-adapters or transformer-base poles—saves $30 to $65 per pole.
- Same outstanding lighting efficiency you have experienced with the General Electric Form 400—best in the industry.
- Low ballast losses.

in Outdoor Lighting from General Electric

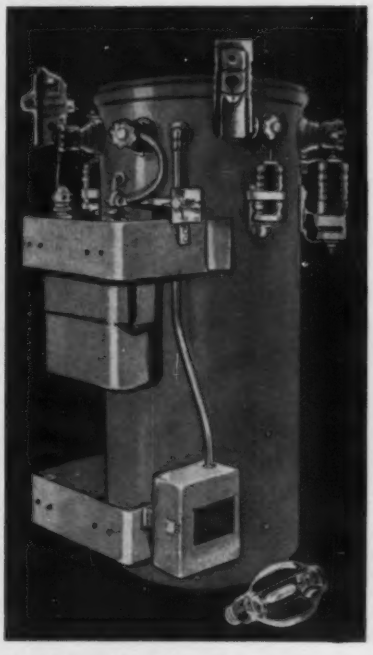
4

NEW FORM 400C
MERCURY LUMINAIRE

ONE-PIECE REFLECTOR HOUSING

- New General Electric one-piece, anodized-aluminum reflector-housing.
- Lighter weight for easy installation and maintenance; larger volume for effective heat dissipation.
- Outstanding versatility; operates five lamps, provides four IES distribution types.
- With precision-molded glass refractor, provides unequalled photometric performance.

5



FOR 400-WATT
SERIES APPLICATIONS

BALLASTLESS MERCURY SYSTEM

- New 400-watt mercury lamp with built-in cutout—*exclusive* G-E development gives reliable operation.
- *Packaged* substation-type regulator —another G-E *exclusive*, combines *all* control equipment in self-contained, pre-assembled package.
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Progress Is Our Most Important Product

GENERAL ELECTRIC

Manufacturers News

Shipments, Orders and Open Manufacturing Capacity for Electrical Equipment, 1957-1961

Total Capacity Shipped and on Order and Scheduled for Shipment	Shipped 1957	Shipped First 9 Months 1958	Scheduled as of October 1, 1958: Last 3 Months 1958	1958	1959	1960	1961 and Later	Total Scheduled For Shipment as of 10-1-58	New Orders Placed 1-1-58 to 10-1-58
LARGE STEAM TURBINE-GENERATORS [3] (10,000 Kw and Larger) [4]									
U. S. El Pwr Sys [1]	10,237,200	10,198,050	4,130,000	14,328,050	9,686,725	8,160,250	3,474,250	25,451,225	2,589,775
U. S. Industrials	1,302,000	99,000	60,000	159,000	125,000	500,000	.....	685,000	30,000
Outside U. S.	675,500	789,650	372,000	1,161,650	1,754,700	269,000	.....	2,395,700	294,450
TOTAL	**12,214,700**	**11,086,700**	**4,562,000**	**15,648,700**	**11,566,425**	**8,929,250**	**3,474,250**	**28,531,925**	**2,914,225**
Est. Open Capacity [2]	.....	.....	.....	.....	300,000	5,000,000	12,500,000 [10]		
SMALL STEAM TURBINE-GENERATORS [3] (4,000 to 9,999 Kw) [4]									
U. S. El Pwr Sys [1]	45,600	28,125	.....	28,125	28,500	.....	.....	28,500	28,500
U. S. Industrials	151,900	36,250	13,375	49,625	36,250	.....	.....	49,625	21,250
Outside U. S.	96,300	42,000	13,500	55,500	47,500	.....	.....	61,000	38,125
TOTAL	**293,800**	**106,375**	**26,875**	**133,250**	**112,250**	.....	.....	**139,125**	**87,875**
Est. Open Capacity [2]	.....	.....	.....	.....	275,000	600,000	600,000 [10]		
STEAM GENERATORS (450-Psi Pressure and Higher) [5]									
U. S. El Pwr Sys [1]	95,184	81,956	14,520	96,476	75,331	13,327	6,809	109,987	23,608
U. S. Industrials	26,166	9,311	3,543	12,854	4,045	4,148	650	12,386	3,880
Outside U. S.	12,202	16,308	5,458	21,766	10,264	1,135	.....	16,857	7,550
TOTAL	**133,552**	**107,575**	**23,521**	**131,096**	**89,640**	**18,610**	**7,459**	**139,230**	**35,038**
Est. Open Capacity [2]	.....	.....	.....	.....	50,000	150,000	165,000 [10]		
STEAM GENERATORS (450-Psi Pressure and Higher) [6]									
U. S. El Pwr Sys [1]	110,027	94,782	16,616	111,398	86,428	15,647	8,097	126,788	27,573
U. S. Industrials	31,879	10,849	4,138	14,987	4,683	4,962	793	14,576	4,393
Outside U. S.	13,587	18,468	6,335	24,803	11,891	1,197	.....	19,423	8,926
TOTAL	**155,493**	**124,099**	**27,089**	**151,188**	**103,002**	**21,806**	**8,890**	**160,787**	**41,092**
WATERWHEEL GENERATORS [7] (4,000 Kw and Larger) [4]									
U. S. El Pwr Sys [1]	1,700,000	1,869,780	300,020	2,169,800	1,788,000	2,339,150	1,220,250	5,647,420	3,867,660
U. S. Industrials	.....	.....	.....	.....	.....	.....	.....	.....	.....
Outside U. S.	47,900	153,500	.....	153,500	7,500	.....	.....	7,500	7,500
TOTAL	**1,747,900**	**2,023,280**	**300,020**	**2,323,300**	**1,795,500**	**2,339,150**	**1,220,250**	**5,654,920**	**3,875,160**
Est. Open Capacity [2]	.....	.....	.....	.....	800,000	1,400,000	2,900,000 [10]		
HYDRAULIC TURBINES (5,000 Hp and Larger) [8]									
U. S. El Pwr Sys [1]	2,600,100	2,252,950	405,000	2,657,950	3,446,000	2,220,610	1,494,000	7,565,610	1,508,700
U. S. Industrials	.....	.....	.....	.....	.....	.....	.....	.....	.....
Outside U. S.	45,000	184,600	108,000	292,600	228,500	.....	.....	336,500	120,500
TOTAL	**2,645,100**	**2,437,550**	**513,000**	**2,950,550**	**3,674,500**	**2,220,610**	**1,494,000**	**7,902,110**	**1,629,200**
Est. Open Capacity [2]	.....	.....	.....	.....	500,000	2,500,000	4,000,000 [10]		
POWER TRANSFORMERS (501 Kva and Larger) [9]									
U. S. El Pwr Sys [1] and U. S. Industrials	70,005	36,420	10,639	47,059	17,189	9,251	2,737	39,816	22,619
Outside U. S.	2,073	1,235	223	1,458	831	.....	.....	1,054	1,549
TOTAL	**72,078**	**37,655**	**10,862**	**48,517**	**18,020**	**9,251**	**2,737**	**40,870**	**24,168**
Est. Open Capacity [2]	.....	.....	.....	15,000	62,000	71,000	77,000 [10]		

[1] U. S. Electric Power Systems. [2] Estimated open manufacturing capacity for production of additional units. [3] Manufacturers' maximum rated capability. [4] Figures in kilowatts. [5] Figures in 1,000 lb steam per hr. [6] Figures in heat output, millions Btu per hr. [7] Manufacturers' rating of generators. [8] Figures in horsepower. [9] Figures in 1,000 kilovolt-amperes. [10] Estimated open manufacturing capacity only for 1961.

Record 14,903 Mw More Scheduled for 1958

A record thermal and hydroelectric generating capacity totaling 14,903 Mw for U. S. electric power systems is scheduled to be put in service in 1958. This is the highest capacity addition planned as of a semi-annual survey closing date, October 1, three months prior to close of the year.

A capacity addition of 8,263 Mw was placed in service during first 9 months of 1958. This is only 55% of the scheduled 14,903 Mw. But it is the third highest in history for a 9-month period and exceeds the amount for the 12-month periods of 1957 (7,970 Mw), 1956 (6,627 Mw). First and second highest additions were in 1955 (9,096 Mw) and 1954 (8,550 Mw).

The record capacity of additions for 1958 is one of several high points of the Edison Electric Institute's 24th Semi-Annual Electric Power Survey.

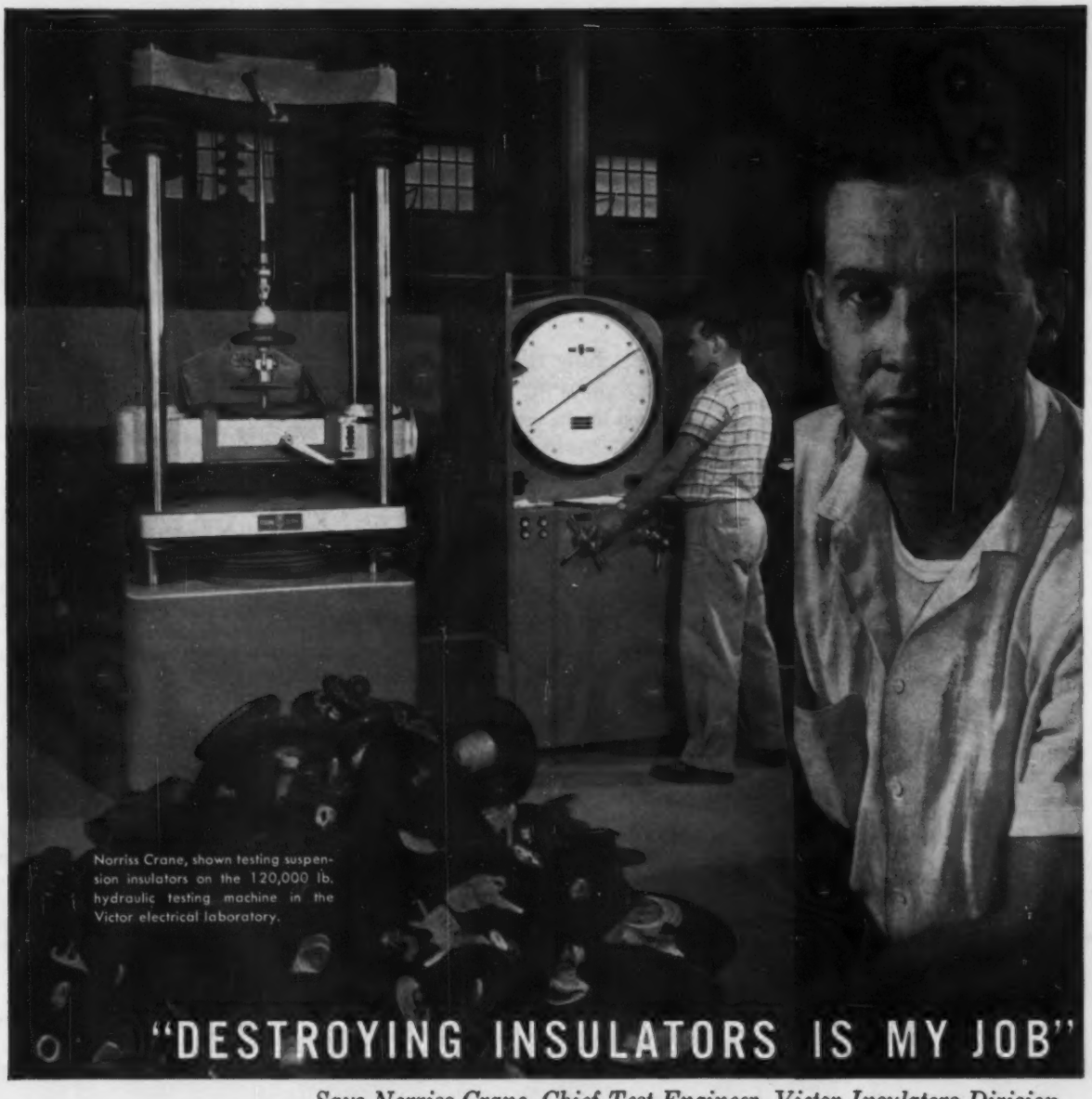
Records have also been established on four additional points covered by data in the EEI survey.

• Steam turbine-generators of 200 Mw and above comprise 46.2% of the scheduled units in the expansion program, whereas the total was 44.5% only 6 months ago. Largest turbine-generator being built is the 500 Mw unit for Tennessee Valley Authority's Widows Creek station.

• Waterwheel generators ordered during the first 9 months of 1958 totaled 3,868 Mw. This amount exceeds the record of any previous annual period (see list under Orders).

• Total generator capacity including U. S. Industrials and Foreign now scheduled for shipment in 1958 is 18,105 Mw (15,782 Mw thermal and 2,323 Mw hydraulic). This total exceeds all prior annual records. It is equivalent to more than 1.5 Mw per month shipment.

(*Continued on page 50*)


Norriss Crane, shown testing suspension insulators on the 120,000 lb. hydraulic testing machine in the Victor electrical laboratory.

"DESTROYING INSULATORS IS MY JOB"

Says Norriss Crane, Chief Test Engineer, Victor Insulators Division, I-T-E Circuit Breaker Company

"The VICTOR insulators that go on your lines will never have to take the mechanical and electrical loading we give them in the VICTOR laboratory. Here, these insulators are subjected to stresses far in excess of the EEI-NEMA Standards. In fact, our continuous quality control testing program shows that VICTOR insulators proof-test at values as much as twice their EEI-NEMA ratings. Such a margin of safety precludes insulator failure on the line."

When you buy VICTOR, you buy practically twice the insulator you pay for. That's why we say: *"VICTOR is the power man's best bargain."*

I-T-E CIRCUIT BREAKER COMPANY, INC.
VICTOR INSULATORS DIVISION
Victor, New York

These S&C Cutouts reduce by shortening the arc,

As any lineman who has closed a cutout on a heavy fault knows, there's a violent blast of flame and "shrapnel." There are three ways to cut down this hazard:

1. Reduce the amount of fuse tube liner (fibre) exposed to the arc.
2. Reduce the energy of the arc.
3. Increase the bore diameter* to reduce the "muzzle velocity."

In S&C's Cutouts having interrupting ratings above 5000 amperes, all three methods are employed — together — making possible the exceptionally high interrupting ratings and at the same time reducing the violence of the blast.

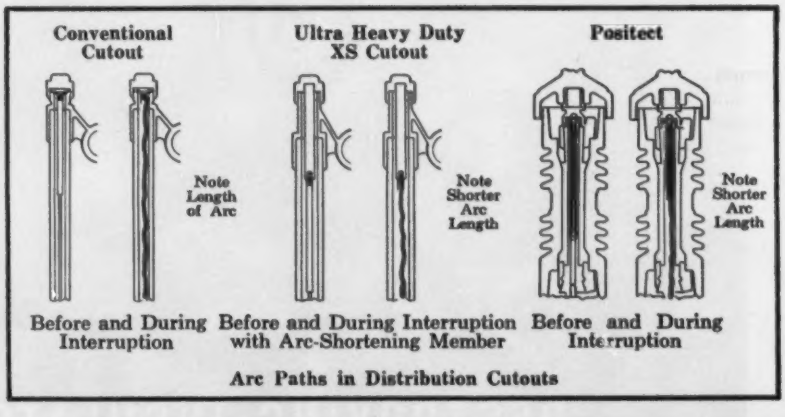
*This can be done without sacrifice of low fault interrupting capability by use of a fuse link made to interrupt low faults, in combination with a high speed terminal-separating device. In the Positect, this latter is a spring and cable assembly; in the XS, a spring-actuated cable flipper.

Here's how it's done:

The length of the arc is deliberately reduced by the use of an arc-shortening member. In the XS Cutout, this member is a husky copper rod; in the Positect, the member is a spring-and-cable assembly.

When the arc length is reduced, the arc voltage is reduced, and in turn the energy in the arc is reduced. At the same time, the arc has less fibre to act upon, and hence less gas is generated. Finally, with a somewhat larger bore in which to expand, the gases are not as violently accelerated out of the cutout's open end.

The result: less energy, less flame, less violence, and less hazard. And while such performance is of special importance at the highest fault levels, this same reduction applies proportionately across the entire range of faults.



Arc Paths in Distribution Cutouts

For voltages up to 14.4 kv

XS CUTOUTS

Open cutouts designed for use with LOADBUSTER®

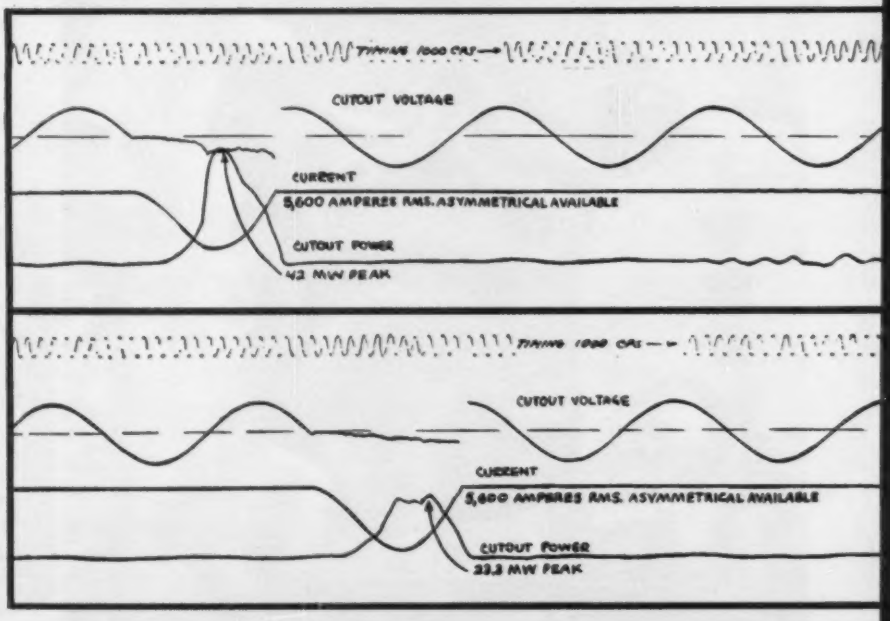
This open cutout is designed for use on modern distribution systems to provide for the two performance factors of most concern: reliable interruption of the heaviest faults with minimum violence and to provide repetitive load switching capability. Available in Extra Heavy Duty and Ultra Heavy Duty styles with arc-shortening rod at 7.2 kv and 14.4 kv. (Also Heavy Duty styles at 7.2 kv, 14.4 kv, 25 kv, and 34.5 kv.) The XS Cutout can switch full rated loads up to 200 amperes with disconnect blade at 14.4 kv when used with LOADBUSTER, the portable loadbreak tool.

exhaust blast reducing the energy

Here's the proof:

This pair of oscillograms shows how "arc-shortening" reduces the arc energy. The upper oscillogram is taken from a test on an XS Cutout *without* an arc-shortening rod; the lower is *with* an arc-shortening rod. Note that the peak power—a measure of blast violence—is virtually cut in half, from 42 megawatts without the arc-shortening rod to 23.3 megawatts with the rod. But the available fault current being handled by the arc-shortening rod is exactly the same, 5600 amps rms asymmetrical. Note also that the maximum arc voltage has been reduced 50%. This is indirectly a measure of the reduced power in the arc.

For additional information: S&C Electric Company, 4421 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.



S&C

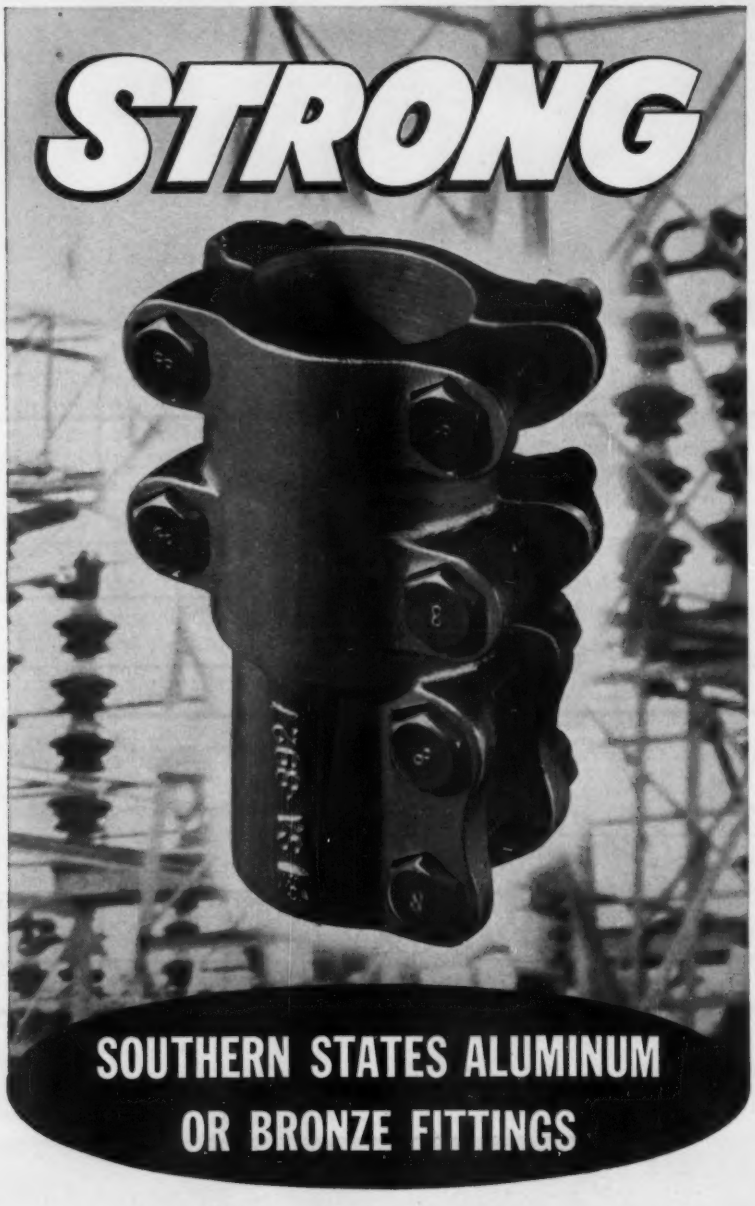
For voltages through 4.8 kv

POSITECT CUTOUTS

Enclosed cutouts with full load switching capability

The S&C Positect is the only enclosed cutout with full load switching capability, without external arc or exposed hot parts. Will switch up to 300 amperes with disconnect tube. Note interrupter attachment which permits full load switching. Designed and tested for closing against faults. In case of fault closing, all blast is directed away from operator.

Specialists in High-Voltage Circuit Interruption Since 1910



Frequent use of connectors as supporting members requires that they be physically strong as well as electrically sound. To achieve this, and yet avoid excessive bulkiness and weight, Southern States uses proven alloys—developed over a period of more than 25 years. All of the fittings in the ever-expanding line of Southern States connectors are designed to assure you of maximum strength. *Never underestimate the importance of a good connection!*

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

Record 14,903 Mw

(*Continued from page* 46)

• Hydraulic turbine capacity of 3,674,500 hp including U. S. Industrials and Foreign is scheduled for shipment in 1959. This is greater than any amount shipped in previous years.

This 24th Semi-Annual Survey covers steam and hydraulic turbines, steam generators, waterwheel generators, and power transformers. The data, compiled as of Oct. 1, relate to shipments, scheduled production, and estimated open manufacturing capacities for the years 1958 through 1961.

Included are totals for U. S. electric power systems, industrials, and foreign installations. Information was furnished by 19 of the country's leading manufacturers of heavy electric power equipment. Data on steam turbine generators are based on manufacturers' maximum rated capability, and generators for hydraulic turbines on nameplate ratings.

Other significant facts revealed by the survey are given under the following headings.

Manufacturing Capacity . . . Total production capacity of manufacturers' generating equipment remains the same (close to 20,100 Mw —16,500 Mw thermal, 3,600 Mw hydro) as given in the previous survey report, as of April 1 (EW, June 23, p. 155).

Production . . . Total program of utility expansion (as of Oct. 1, 1958) from Jan. 1, 1958 through 1962 and later totals 52,143 Mw.

Generating capacity of 13,474 Mw (thermal and hydro) (for the three types of purchasers) scheduled for production in 1959 is about 74% of the amount (18,105 Mw) scheduled for 1958. The capacity for 1960 is 62% of 1958 schedule, and for 1961 and later is 26%.

Steam generators (boilers) scheduled for shipment for the three types of purchasers in 1958 have a total steam capacity of 131,096,000 lb per hr. This will almost reach the record of 133,552,000 lb per hr scheduled in 1957.

Power transformer shipments during first 9 months this year total 37,655 Mva. This time last year

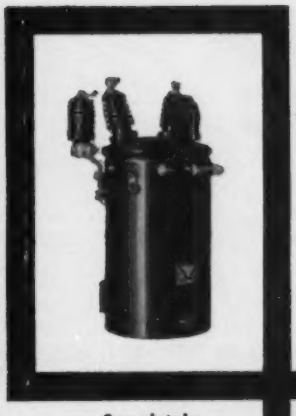
(*Continued on page* 53)

VERSATILE

RT&E

Designs distribution transformers in standard and special styles to meet all requirements

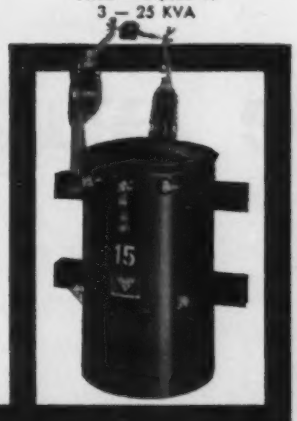
Conventional
2400 V. — 25 KVA
Typical Construction
4800 V. and below
5 — 25 KVA



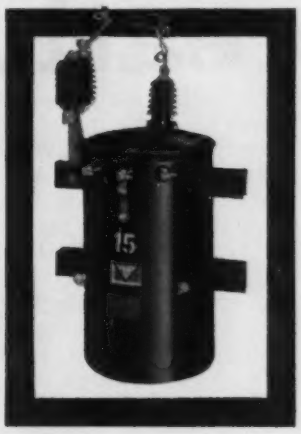
Completely Self Protected
7200 V. — 15 KVA
Typical Construction
7200 V. thru 14,400 V.
5 — 25 KVA

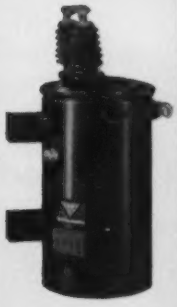
Duplex
7200 V. — 10/15 KVA
Typical Construction
7200 V. — 7620 V.

Protected with Double Gap and Loadguard
7200 V. — 15 KVA
Typical Construction
7200 — 14,400 V.
3 — 25 KVA



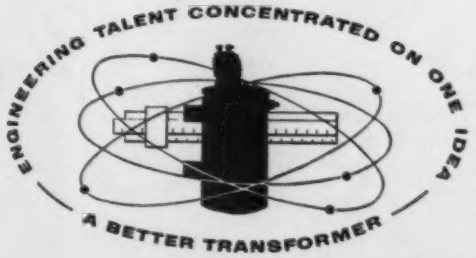
Protected with Arrester and Loadguard
7200 V. — 15 KVA
Typical Construction
7200 V. — 14,400 V.
3 — 25 KVA





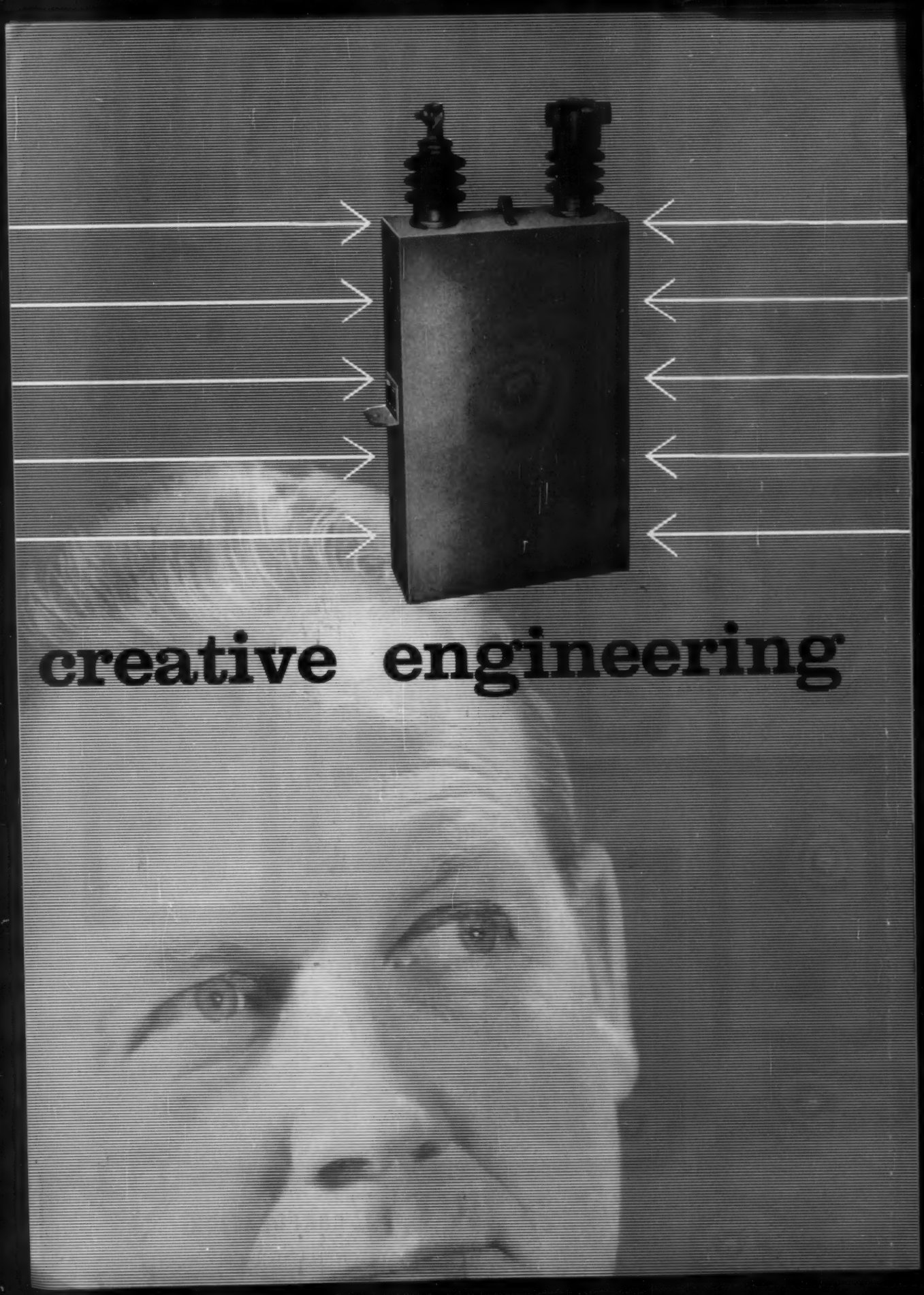
Dual Voltage
2400 V. x 7200 V. — 10 KVA
Typical Construction
Combinations thru 14,400 V.
5 — 25 KVA

Conventional
7200 V. — 100 KVA
Typical Construction
7200 V. — 14,400 V.
75 — 100 KVA



RT&E CORPORATION
WAUKESHA, WISCONSIN • PORTLAND, OREGON

V


creative engineering

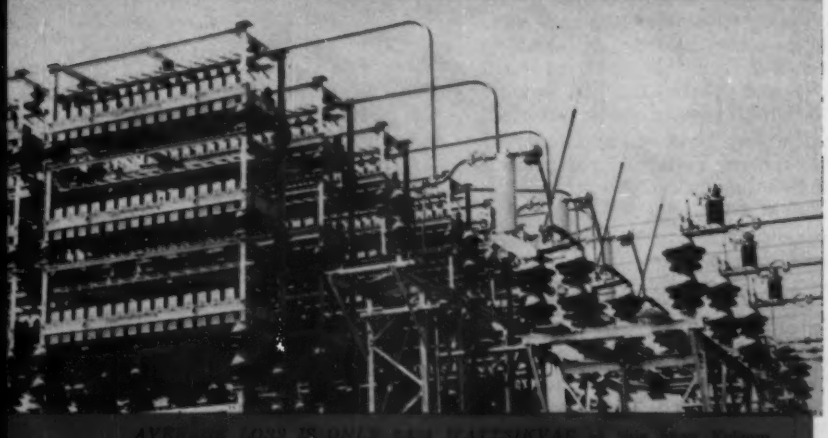
"Creative engineering," as it applies to Tobe, has two meanings. First, it means the factory-supervised field attention we give to a customer's specific power capacitor problem (like the tricky Monel Metal cases we helped work out for a "flood-proof" manhole installation). "Creative engineering" also aptly describes the research, design and quality control innovations Tobe has developed at its modern Norwood, Mass. plant.

For instance:

• Unique Tobe control procedures which assure thermal stability (This is why we call them "Tempall" Capacitors.) • Self-locking neoprene terminal caps* • Stainless steel case, at no extra cost • Special clamp arrangement with vibration-proof nylon-insert stop-nut on line hardware • Discharge resistors across each series group • Low losses to give you more correction for your dollar (see below).

Investigate Tobe Tempall Capacitors today. Available in all standard ratings; in single units, racks, pole assemblies and cabinets.
Write Tobe Deutschmann Corporation, Norwood, Mass.

in action



AVERAGE LOAD IS ONLY 5434 WATTS/KVAR at the Sage Folsom Electric California Substation of the Bureau of Reclamation. Tobe's unique method of impregnation allows individual control over each unit, contributes to this remarkable performance. (NEMA standard is 12 WTS/KVAR.)

TOBE® TEMPALL CAPACITORS

Since 1919 perfected research, ironcurtain engineering, rigid production standards.

*Patent Pending

Record 14,903 Mw

(*Continued from page* 50)

it was 54,772 kva for all purchasers. Total scheduled for 1958 will be 48,517 Mva. Backlog as of Oct. 1 is 40,870 Mva (through 1961 and later).

Shipments . . . Total (thermal and hydro) generator capacity shipped to all three types of purchasers in the first 9 months this year amounted to 13,216 Mw or approximately 73% of the 1958 schedule (18,105 Mw).

Shipments of 12,096 Mw generator capacity for the same period only for U. S. power systems exceed by 113 Mw that delivered for the year 1957.

Orders . . . Waterwheel generators on order are: For Lewiston Station (Niagara project)—13 units of 150.3 Mw each or total 1,954 Mw; for Rocky Reach project, PUD No. 1, Chelan County, Wash. —7 units of 101.65 Mw each or total 712 Mw; for Oahe Dam, U. S. Army Corps of Engineers—7 units of 85 Mw or total 595 Mw; other projects of smaller capacities total 607 Mw. Grand total is 3,868 Mw.

Total thermal and hydro generator capacity to be built (as of Oct. 1) for Industrial and Outside U. S. Purchasers is about 10% of total backlog of 34,326 Mw for the three classes of purchasers from Oct. 1, 1958 and through 1961 and later. This indicates the magnitude for those two classes of purchasers.

Nuclear Projects . . . Following nuclear projects are scheduled for operation in the year indicated: Consolidated Edison Co of N. Y., Indian Point No. 1, 255 Mw, scheduled for operation in 1960; Commonwealth Edison Co, Dresden No. 1, 180 Mw, 1960; Detroit Edison Co, Enrico Fermi, 100 Mw, 1960; Yankee Atomic Electric Corp, Rowe Unit, 145 Mw, 1960; Rural Coop Power Association, 22 Mw, 1960; Nebraska Public Power System, Sheldon No. 1, 75 Mw, 1961; Northern States Power Co, Pathfinder, 66 Mw, 1962; and Pacific Gas & Electric Co, Humboldt Bay No. 3, 60 Mw, 1962.

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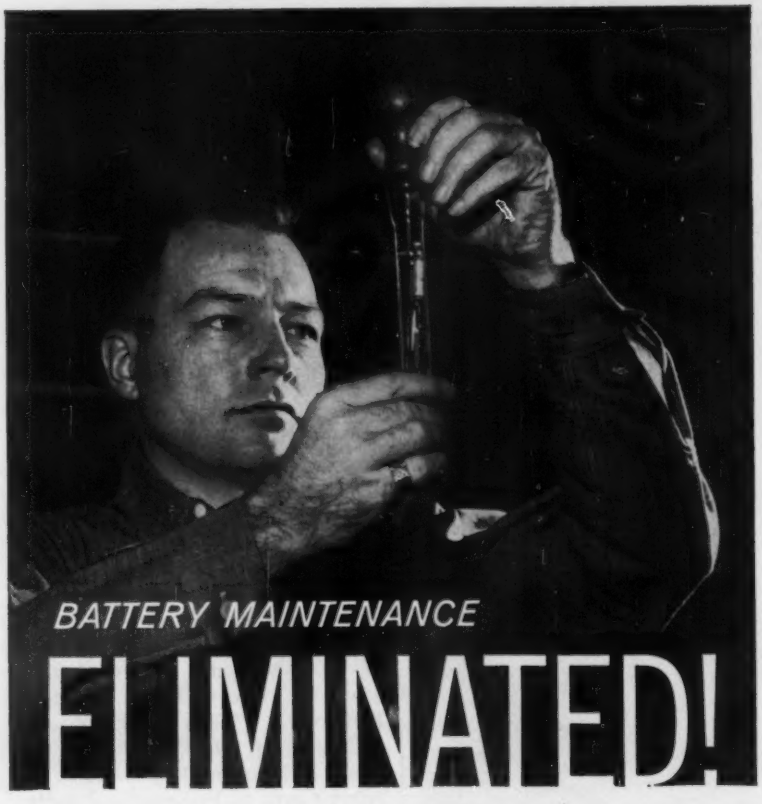
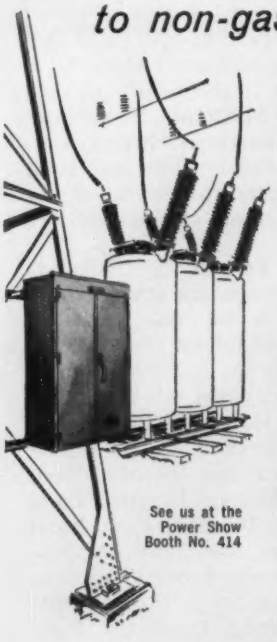
(*More Manufacturers News, page* 54)



You don't add water or electrolyte to non-gassing Gulton Power Units



THINK of the savings in maintenance alone! Right now your battery installations are serviced about once a month. Your maintenance man takes an hour, probably more, to check specific gravity and cell voltage, add water—return a second time if booster charge is needed.

With Gulton Power Units—no maintenance! That's because famous Voltabloc® non-gassing *sealed* nickel cadmium batteries operate year after year *without attention.*

You also *save on real estate;* reason: the patented sintered plate construction of the Voltabloc and the compact automatic charger. Together these deliver 20 times the punch, take 1/20 the space of conventional units.

Thus you get all the power you need for closing and tripping switches, breakers, etc., in a fraction of the space needed by ordinary DC sources—entirely eliminate the need for battery rooms and high installation costs.

Find out now how Gulton Power Units are saving other companies time and money. Write for Bulletin No. GPU.

ALKALINE BATTERY DIVISION
Gulton Industries, Inc.
Metuchen, New Jersey
In Canada: Ward-Leonard, Toronto

Gi

Cole Electric Markets Oil Circuit Breaker

The Type FC oil circuit breaker, 3-phase, self-contained, solenoid-operated, is ready for marketing by Cole Electric Co, Culver City, Calif. It is available in 7.2, 14.4, and 23-kv, 600 and 1200 amp ratings.

Some features of this breaker are: (1) Operating mechanism attached directly to the breaker in a plane normal to the three phases. (2) Seamless tank which meets ASME hydrostatic pressure test requirements. (3) Bushings emerge from the tank head at a slight angle. This design allows the same breaker to be used up to 23 kv merely by changing the bushings. (4) Current transformers are of the multi-ratio, bushing-type with primary current taps. (5) Two interrupters used for each pole. (6) Contacts are tulip and bayonet design.

PLANT EXPANSIONS

• A new stock location for fast delivery service to customers in Kansas City and St. Louis territories has been established by Delta-Star Electric Div., H. K. Porter Co, Inc. The new warehouse carries the Thomas line of insulators and Crystal valve lightning arresters at Kansas City, Mo.

• A 40%-increase in plant capacity of Minneapolis-Honeywell Regulator Co's Beltville, Md., factory has doubled production space because of the re-arrangement of operations it permitted. The expansion was effected to meet the demand for high-speed data-recording equipment. The Beltsville plant is a unit of Honeywell's industrial products group.

• Modern facilities are provided by the new building into which John A. Roebling's Sons Corp, Trenton, N. J., recently moved its San Francisco district offices and warehouse. New hydraulic reel-handling facilities, large capacity overhead crane, ample parking space, and large truck and railroad docks are some of the features.

(*More Manufacturers News, page* 56)

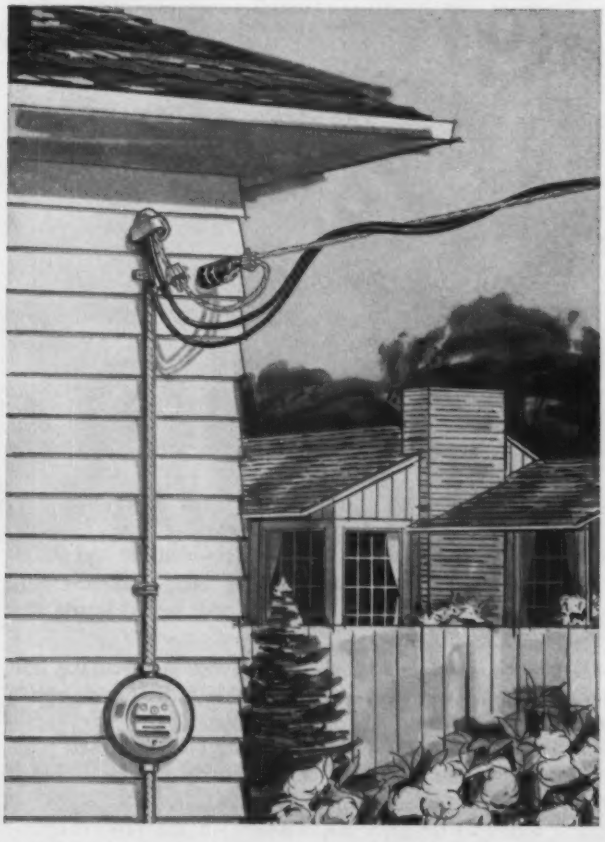
NOW! LOOK HOW MUCH YOU SAVE BY SWITCHING FROM COPPER TO ALUMINUM SE-U!

COST COMPARISON—ALUMINUM VS. COPPER

Service Entrance Cable
Concentric Uninsulated Full Neutral, Braid Jacketed
Underwriters' Type SE, Style U, 75° C. Operation

SERVICE		ALUMINUM		COPPER		SAVINGS WITH ALUMINUM	
Amperes	Feet	Conductor Size AWG	Cable Cost $	Conductor Size AWG	Cable Cost $	$	%
100	20	2	5.50	3	9.10	3.60	40
.....	40	2	11.00	3	18.20	7.20	40
.....	60	2	16.50	3	27.30	10.80	40
150	20	2/0	9.46	1/0	21.48	12.02	56
200	20	4/0	12.80	3/0	30.28	17.48	58

NOTE: Based on prices in effect as of September 15, 1958.



Check the table... at today's prices, braided aluminum SE-U saves you money over copper right down the line!

Note that the cost of #2 aluminum SE-U is *40% lower* than #3 copper SE-U. With the trend toward larger sizes, savings with aluminum become even greater—up to 58% for 200 ampere service! Neoprene jacketed aluminum cables offer similar savings.

FREE BROCHURE GIVES YOU THE FACTS

Our new, free brochure, *"KW Service Entrance Cable,"* points out the distinctive characteristics of both braided and neoprene jacketed aluminum cable, and fully explains why this cable offers definite advantages over copper.

It also describes and illustrates applications of SE-U Cable, as well as Single Conductor in Conduit, and contains a list of manufacturers of accessories for both applications.

Get your free copy of this informative 8-page brochure now. Mail the coupon!

KAISER ALUMINUM

IF IT CARRIES CURRENT, KW CARRIES IT!

Kaiser Aluminum & Chemical Corp.
Dept. 953
919 N. Michigan Ave., Chicago 11, Ill.

Please send your free brochure,
"KW Service Entrance Cable."

Name_____

Address_____

City_____ State_____

EWo

Seal oil IN! Seal moisture OUT!

with

J-M TRANOLSEAL

developed especially for efficient sealing against refined oils

You can stop the dangerous and costly leakage of oil from transformers and switchgear with Johns-Manville's Tranolseal sealing compound. This permanently plastic material has a nondrying vegetable oil base. It provides effective sealing action against air (dust and moisture), inert gas, water, 13% NaCl brine as well as medium to high viscosity refined oils. Thus you can also prevent penetration by moisture and other ambient sources of trouble.

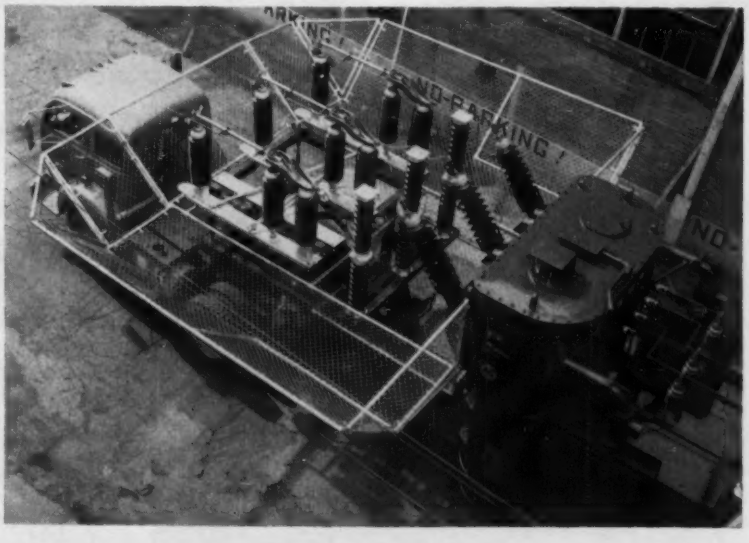
Tranolseal has excellent adhesive qualities and will not corrode or deteriorate metals, rubber or plastics. It shows good resistance to weather and aging (both painted and natural) and won't stain. Furnished in 1" diameter beads. For further information write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit (Toronto), Ontario.

Johns-Manville

SEALING COMPOUNDS

O-B Executives Tour Mansfield Plant

Top echelon tour is given J. Howard Holan (center) by Ohio Brass Co's Chairman George L. Draffan (right) and President Roger A. Black (left). Features of Varex capacitors were pointed out during trip through O-B's Mansfield plant. Occasion followed merger (EW, Sept. 15, p 60) of J. H. Holan Co., Cleveland, O., into Ohio Brass, as wholly-owned subsidiary. Howard Holan became a vice president of O-B, remained president of his company, newly named Holan Corp.



A-C Designs Mobile Substation Fence

A protective, folding-type, aluminum fence is provided for the 7500-kva, 3-phase, 60-cycle mobile substation built by Allis-Chalmers Mfg Co at its Pittsburgh Works, for Southern Indiana Gas and Electric Co, Evansville, Ind.

The fence is expanded around the high-voltage section when the unit is connected to the power lines (see illustration). It folds in through a system of pivots when the substation is on the highway.

The substation has its retractable phase mounting bars in closed position while in transit. When placed in service, the phases can be extended 14 ft in conformity with NEMA standards.

TIME IS THE MEASURE OF ALL WOOD PRESERVATION

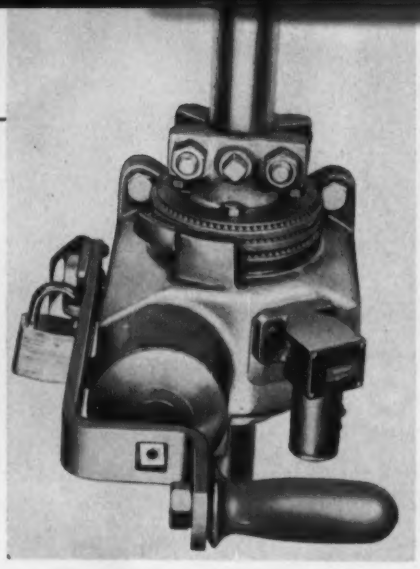
Business or hobby, you know the importance of protecting your investment in wood.... For industry, the testimony of time shows that the longest, most practical protection comes from AMCRECO pressure treatment.

AMCRECO
PRESSURE TREATED WOOD PRODUCTS

AMERICAN CREOSOTING CORPORATION LOUISVILLE 2, KENTUCKY
SUBSIDIARY OF UNION BAG-CAMP PAPER CORPORATION

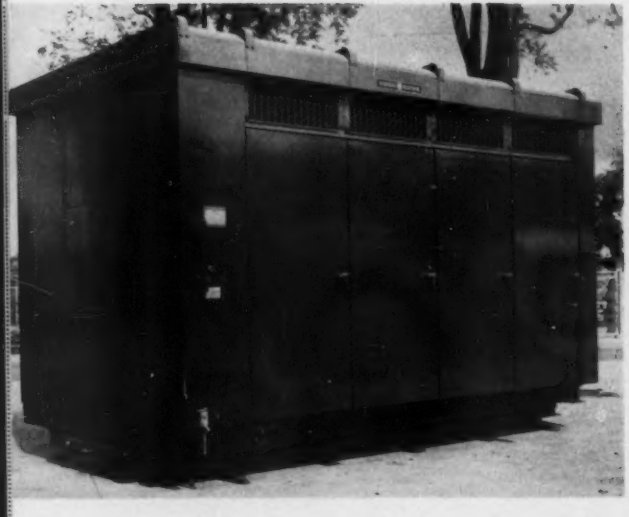
New Equipment

Gear Box . . .



. . . for torsional operating mechanisms of power switches mounts easily at most convenient height without cutting or drilling the operating shaft. The gear box is doubly keyed to the operating shaft with a bolted clamp and two self-piercing set screws. The removable handle stores compactly and locks the shaft in a fixed position. Open and closed stops are completely adjustable through 360 deg. The gear box has a shaft opening for 1½-in. IPS pipe and is available in 20.5:1 and 40:1 gear ratios.

Line-Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.



High Voltage Capacitors . . .

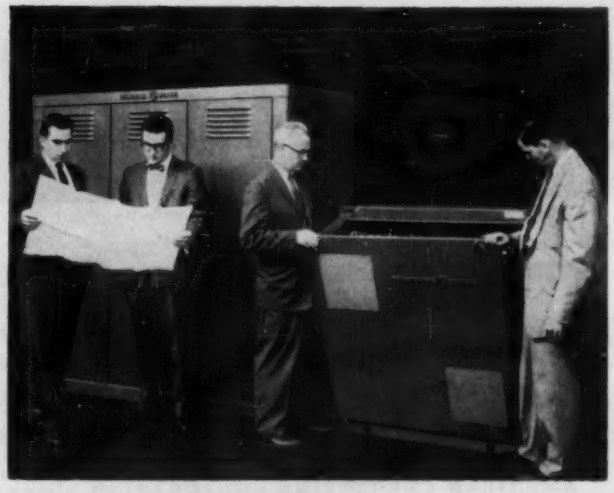
. . . are installed in standard sections mounted on a continuous base. The basic section contains 1,200 kvar of capacitors and an interlock and grounding device. Additional sections rated 1,200 kvar each can be added to bring the total kvar rating to 3,600 for 5-kv equipment and 6,000 kvar for 15-kv equipment. When required, a section including an air or oil circuit breaker or capacitor switches is supplied.

General Electric Co, Schenectady 5, N. Y.

Drive Units . . .

. . . in a new line show size reductions up to 35% over comparable existing drive units from 3 to 350 hp. Called the "Super "T" V*S Drive", the packaged system will commutate up to 200% current for periods of 1 min, and will handle even higher transitory peak loads. Speed control is available over an 8:1 range by armature voltage, and over a 4:1 range by field control.

Reliance Electric and Engineering Co, 24701 Euclid Ave, Cleveland 17, Ohio



(*More New Equipment, page* 60)

experience

keeps BICC *in the lead*

Being the World's greatest cablemakers is not just a matter of size.
It's also, generally speaking, a case of knowing more than the other fellow.
The experience gained from making BICC cables and accessories for every electrical purpose has helped us pioneer many developments in our field.

This 138 kV submarine cable had to be 16 miles long *–unjointed !*

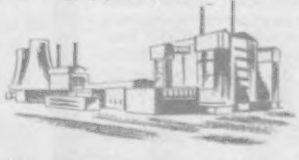
The power link between the British Columbia mainland and Vancouver Island required more than 133 miles of 138kV single-core submarine cable, including seven 16 mile lengths — each without a single joint. Making such unjointed lengths of cable was considered to be 'impossible' in the electrical world. But BICC made and laid them with conspicuous success. Altogether some $10,000,000 of power cable contracts have been placed with BICC by the British Columbia Electric Company Ltd.

D.S.O. FOR ECONOMY

The Ductless Shaped-conductor Oil-filled cable is BICC's latest development in 33kV transmission. Dispensing with fillers and built-in ducts, it costs less than conventional cables of equal duty.

CABLES FOR THE FIRST NUCLEAR POWER STATION

BICC supplied cables and accessories for Calder Hall, England, the first nuclear power station in commercial operation. The cables include specially designed types resistant to intense radiation and heat, for operating the fuel charging and discharging grabs.



330,000 VOLT CABLE FOR KARIBA

The Kariba Dam is being built on the Zambesi river to provide hydro-electric power for Central Africa.

Transmission equipment for this project is being manufactured by BICC. Altogether orders for this company total some ten million dollars and include a specially designed 330,000 volt single-core oil-filled cable — at present being manufactured — which will connect the underground power house to the overhead transmission lines. This will be the highest voltage cable ever installed in Africa.

BICC **the World's largest cablemakers**

BRITISH INSULATED CALLENDER'S CABLES LIMITED
Technical Representative in U.S.A., Arthur F. Coventry, 11 West 42nd Street, Suite 442, New York 36, N.Y.

New!

BERMICO® ParQuay conduit used on New York State Thruway

Installing 2" Bermico ParQuay Conduit. Trench was backfilled with New York State specified clean fill

...because "it saved us 50% in material and handling costs," says James Owens,

Installation Foreman, Domizio & Everts, Inc., Yonkers, N.Y.

"The use of this direct-burial bituminized fibre duct with its taper joints and couplings makes it possible to lay it twice as fast as we could lay rigid type conduit," Mr. Owens continues. The installation extends along both sides of a 3½-mile stretch of the Thruway's New England Section, carrying electrical wiring for highway lighting.

Bermico ParQuay (pronounced parkway) is precision engineered from cellulose fibre impregnated with coal tar pitch. It is uniform in quality, with smooth inside bore allowing easy cable pull-through without risk of abrasion. It is highly resistant to acids, alkalies, heat, water and corrosion. Bermico ParQuay's resiliency permits it to follow the natural contour of the highway at laying level!

Why not take advantage of the benefits of Bermico ParQuay Conduit for your next street or runway lighting job, or wherever direct burial conduit may be utilized. Available in 2" and 3" diameters. For specifications and prices consult your nearest Wesco office.

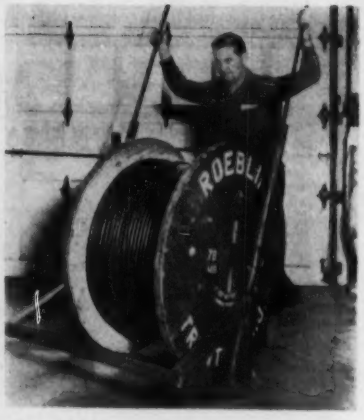
Distributed by WESTINGHOUSE Electric Supply Company

Offices in principal cities

BROWN QUALITY COMPANY

General Sales Offices: 150 Causeway Street, Boston 14, Mass.

Mills: Berlin, N. H.; Corvallis, Ore.



Cable Reel Lifter . . .

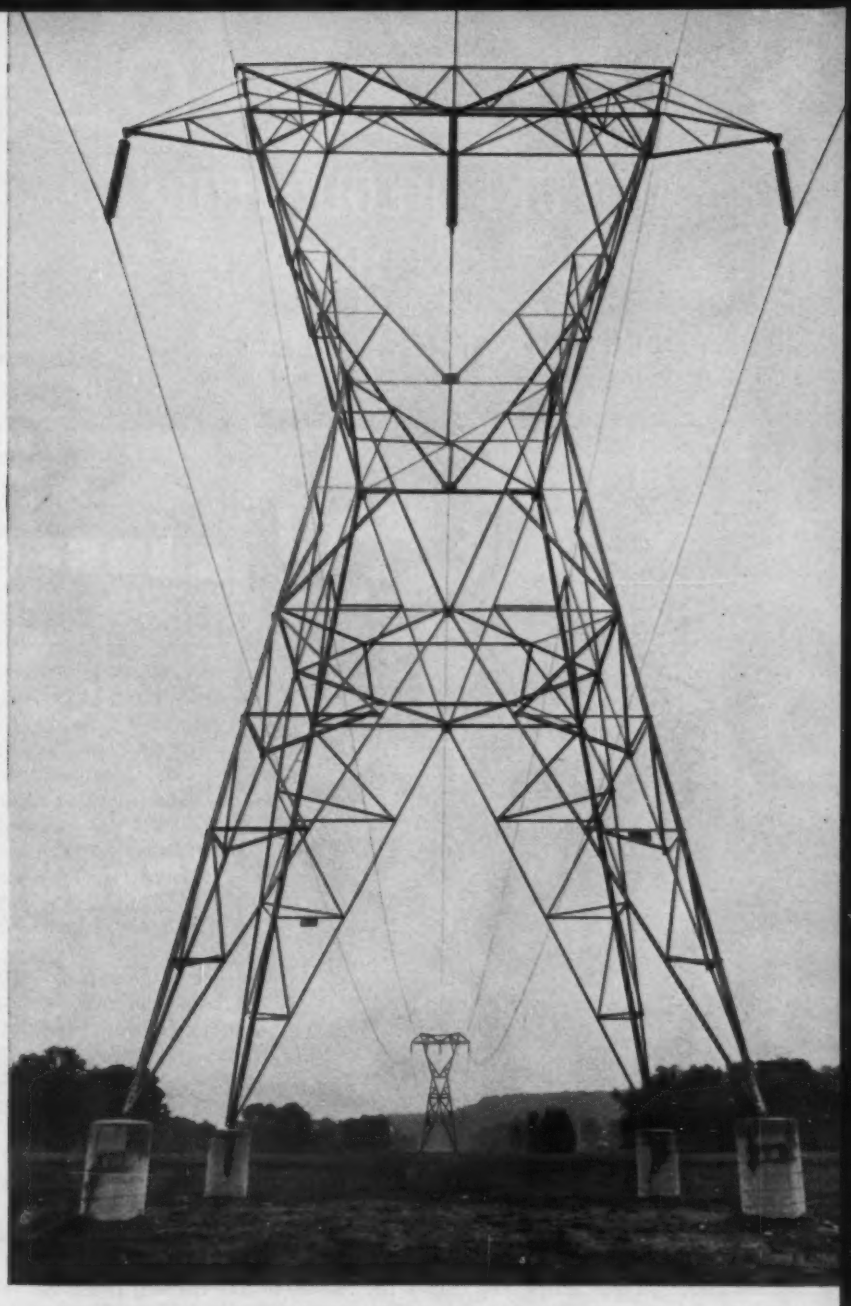
. . . enables one man to lift a 1,152-lb reel. Two men can lift larger reels weighing over a ton. Heavily loaded reels are easily raised and positioned for cable pay-out with the portable Hykon Reelift. Adjustable to various reel diameters, the Reelift has an all-welded base of reinforced angle iron and measures 2 x 3 ft. It handles up to 48-in. diameter reels. **Hykon Mfg Co, Box 923, Alliance, Ohio**

Data Integrator . . .

. . . eliminates key punch operations, reduces storage space and minimizes card consumption. The spinet-sized Data Integrator accepts fixed information from punched cards and variable data from its keyboard. These items are automatically combined in a single block and translated together onto punched tape. The tape, containing both fixed and variable information, is immediately ready to be fed into computers. **Taller & Cooper, Inc, Los Angeles, Cal.**

(*More New Equipment, Page* 62)

To withstand severe flooding in the Brandywine Creek area, over three miles of towers were designed with special foundations.



Philadelphia Electric uses 110 Blaw-Knox Towers to bring more power to Delaware County

From Bradford to Chichester—that's the route of Philadelphia Electric's new nineteen mile line. Carrying 220,000 volts, the new line will bring increased power to the highly industrialized lower Delaware County area.

Working as a team, Philadelphia Electric and Blaw-Knox engineers designed new light-weight towers to support three 795,000 CM ACSR conductors and two 134,600 CM ACSR groundwires.

Combining specific tower requirements with solid concepts of good tower design has been a Blaw-Knox specialty for over 40 years. Backed by this extensive experience, these skillfully engineered towers are noted for outstanding structural design, simple field erection and easy modification.

Folder 2509 details this know-how in tower engineering and fabrication. Send for your copy and tell us your needs. We'll gladly give you our recommendations and a quotation.

Transmission Towers—Steel Transmission towers, custom-built for each installation . . . multi-circuit and other special structures . . . and antenna towers, guyed and self-supporting types for AM • FM • microwave • communications • radar • parabolic antennas.

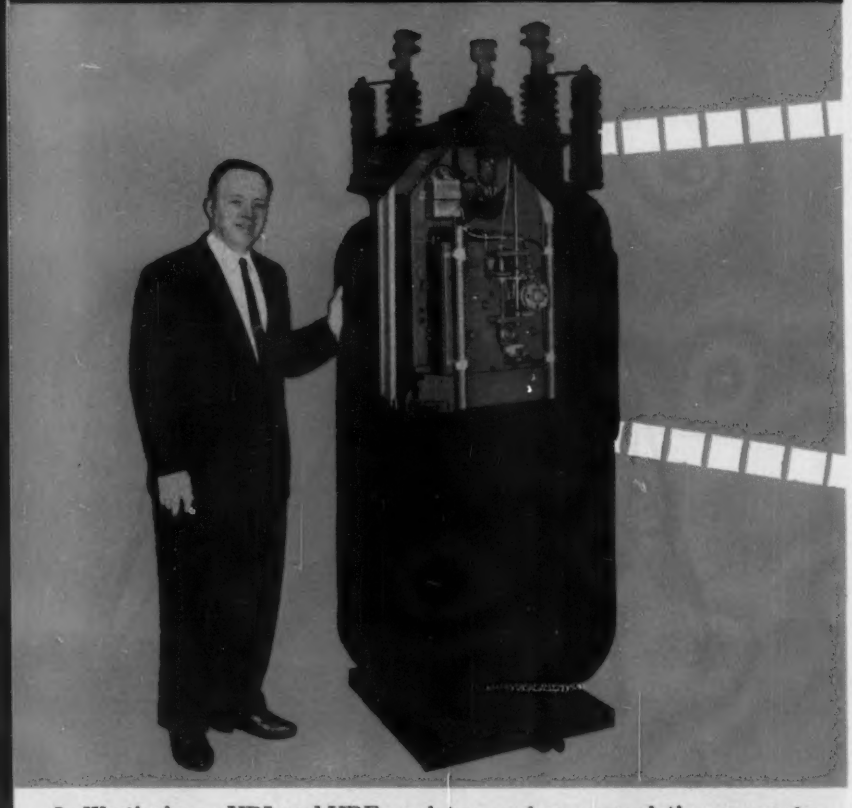
BLAW-KNOX

BLAW-KNOX COMPANY
Equipment Division
Pittsburgh 38, Pennsylvania

BK-4403

Ask your Westinghouse representative
about the exclusive benefits you get from

URL AND URF REGULATORS... "LIKE NEW" PERFORMANCE FOR TOMORROW'S LOADS



In Westinghouse URL and URF regulators, carbon accumulation *cannot* clog cooling ducts. Changing taps under load in a regulator requires interrupting an arc under oil and this arcing causes the release of free carbon. If not restrained, this accumulation *can* clog cooling ducts, reducing cooling efficiency and stealing load-carrying ability. Under heavier loads more carbon is released and in time overheating may become a problem.

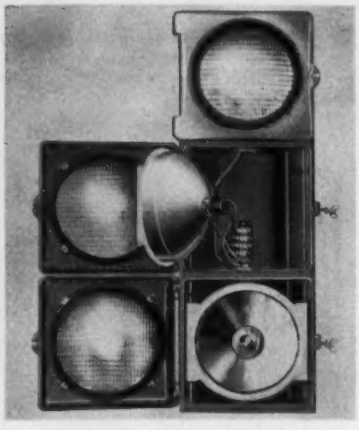
A separate tap changer compartment in each URL and URF regulator keeps carbon out of the main tank oil. This prevents carbon build-up in the cooling ducts . . . cooling efficiency and load-carrying ability remain high.

In feeder voltage regulators, only Westinghouse URL and URF regulators offer a separate tap changer compartment — at no extra charge. Here is your assurance that the full value of *like-new* performance will still be yours — even ten or twenty years from now.

See your Westinghouse representative for the full story of better regulation — from URL and URF regulators — made possible through PLOWBACK OF EARNINGS into research for the solution of the electric utility industry's immediate and long-range problems. J-70895

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS," CBS TV MONDAYS



Traffic Signal . . .

. . . features high-polish Alzak aluminum reflector to eliminate sun phantom. Known as Model M-3, it is housed in a die-cast aluminum chassis enclosing 1, 2, 3, 4, or 5 sections. Each section is self-contained with integral top and bottom, for individual removal and replacement. One-piece reflector assemblies snap in or out. Five-terminal connection block with one spare terminal provides for expansion.
Crouse-Hinds Co, Syracuse 1, N.Y.

Power Megaphone . . .

. . . broadcasts speech over a full quarter mile range. Known as the Falcon "Chief", the transistorized megaphone weighs only 3¼ lb with battery and measures 15¾ in. long x 9½ in. maximum diameter. The battery is capable of 6,000 two-second messages.
Falcon Alarm Co, Inc, Summit, N. J.

Segment Plate . . .

. . . minimizes motor failures due to splitting of segments or loosening

of commutator bars. The micaceous plate, called ISOMICA No. 2080-5, is characterized by extreme uniformity, especially in the distribution of the shellac bonding agent through the reconstituted mica platelets. Primary use of the plate is in commutator construction as insulation between copper bars. Its excellent punching characteristics also make the material useful for washers and other fabricated parts.
Mica Insulator Div, Minnesota Mining & Mfg Co, Schenectady 1, N. Y.

Insulation Tester . . .

. . . meets requirements of about 30 ASTM specifications for electrical insulating materials such as varnishes, paper, tape, glass, phenolics, and rubber in rods, tubes and sheets. The Model 4501 35-kv high-potential tester features motor driven rate-of-rise with manual override and return of output voltage. Output terminates in test fixtures contained in transparent safety-interlocked test cage.
Associated Research, Inc, 3777 W Belmont Ave, Chicago 18, Ill.

Self-Sticking Label . . .

. . . consists of a pressure-sensitive card that can be written or typed upon, and then covered with an attached clear layer of outdoor type plastic for permanent protection. Called MC Labelon, it is designed to withstand rain, dirt and sunlight, and is not affected by grease, oil or acids. Labels are available with

colored borders in black, blue, red or green, and sizes range from ⅝ x 1¼ in. through 2 x 3¼ in. They are packaged in tray-type boxes.
Labelon Tape Co, Inc, 450 Atlantic Ave, Rochester 9, N. Y.

More New Products

Small **transformers** convert 220 or 440 v to 110 v wherever the lower voltage is required. Known as the Mullenbach P/S/P (Power Step-down Package), the 10x6x5-in. unit can be bolted directly to equipment operating on the higher voltage. The 150-va (1.5-amp) secondary uses a normal convenience outlet.—Mullenbach Div, Electric Machinery Mfg Co, Los Angeles.

R-I-E meter is unusually stable. Resistance is measured from 2 to 2×10^{8} megohms, with limits of error between ± 1.7 and $\pm 6\%$. Current measurements of 1×10^{-12} to 5×10^{-6} amp and voltage measurements from 0.005 to 500 v are also possible.—Leeds & Northrup Co, Philadelphia 44, Pa.

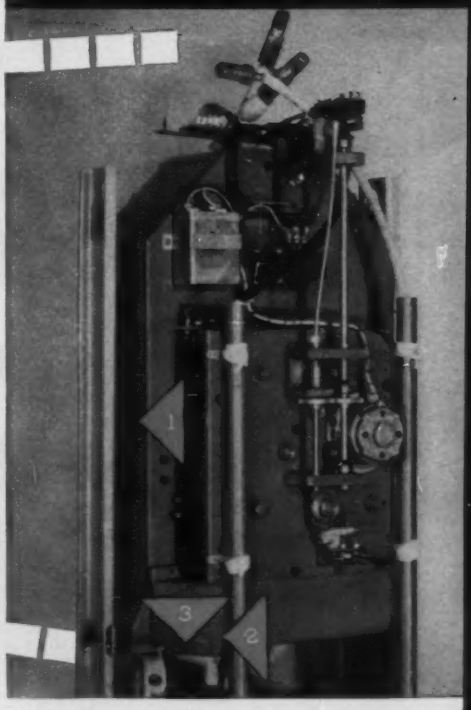
Straddle carrier has 30,000-lb capacity. A four-speed, full reversing transmission offers a wide range of speeds for varying travel conditions. In low gear the carrier can climb an 18% grade fully loaded.—Hyster Co, 2902 N E Clackamas St, Portland 8, Ore.

Compact, light weight **mobile radio** features combination of control head, speaker, and transistorized power supply in one case assembly. Called the "580 FLEETCOM", the small, easily-handled unit fits under the dash or at any convenient location. It is designed for split-channel operation.—Communications Co, Inc, 300 Greco Ave, Coral Gables, Fla.

Exclusive separate

tap changer compartment

GUARDS SYSTEM LOAD CAPABILITY



The separate tap changer compartment built into your Westinghouse URL or URF regulator is your assurance of peak operating efficiency — now, and *for future loads.* Here are the three basic construction features that provide constant service reliability with minimum maintenance:

1. Felt gasketing keeps carbon out of the main tank and permits equalization of the oil level at all times.
2. Sump collects sediment which is easily, quickly drawn off.
3. Separate external drain facilitates renewal of oil in tap changer compartment.

Only Westinghouse URL and URF regulators (available in sizes 250 kva or below) offer all these bonus values of the separate tap changer compartment for distribution-type regulators. J-70896

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

NEW!

ROME *TRIMLINE** PRIMARY DISTRIBUTION SYSTEM

WITH A NEW SIMPLIFIED, STREAMLINED SPACER DESIGN!

A Practical Overhead System. Developed for utility and industrial distribution circuits ranging from 5 to 15 kv, Rome's TRIMLINE* system consists of (1) a unique and highly simplified Plexiglas supporting spacer, (2) extruded black, high molecular weight polyethylene insulated phase conductors (either one, two, or three phase), and (3) a high strength supporting messenger.

This economical method of overhead distribution is recommended for installations where:

- additional circuits are required on a pole
- poles are too crowded
- bad tree and storm conditions cause havoc with open-wire lines
- alleyways prohibit use of crossarms

. . . and especially where a *compact* and *neat-appearing* distribution system is necessary!

System Features New Spacer. Now . . . a new spacer design makes Rome's TRIMLINE* system as reliable as it is practical. The one-piece Plexiglas spacer offers distinct "reliability" features. It has no mating or matching surfaces to form cracks or crevices which collect water or other contaminants. This in turn reduces the possibility of eventual arcing or shorting.

Each spacer is equipped with four "snap-lok" neoprene grommets (adapters). Special molded-in compression rings in each grommet assure a snug spacer-to-cable fit. The constant pressure exerted upon the messenger and conductors restricts the spacer from "traveling" on the line.

The spacer itself is shaped like a diamond with rounded corners and smooth edges. When installed, each of the phase conductors and the messenger are completely contained within the encompassing spacer unit.

Installation of the spacer unit is performed with no tools or special equipment, requires *no* nuts or bolts. And maintenance is just as easy—phase conductors can be removed or added without removing the spacer from the messenger. Spacers are placed approximately thirty feet apart along the entire length of the distribution system.

*T. M. (patent applied for)

HERE'S WHAT THE TRIMLINE SYSTEM OFFERS YOU:

1. A *single* spacer for 5 to 15 kv range.
2. Abrasion-resistant high molecular weight polyethylene insulation or other suitable materials as specified by the user.
3. Neoprene grommets with molded-in compression rings.
4. A spacer that completely encloses phase conductors and messenger.
5. A high strength supporting messenger that provides storm damage protection, thereby permitting . . .
6. Longer spans—the system messenger permits spans up to 300 feet.
7. Positive phase identification by position in spacer.
8. Lower reactance than conventional open-wire lines.
9. Ease of installation.
10. Neat, compact overhead distribution. Better public relations.

Send in the coupon for our new bulletin on Rome TRIMLINE* Primary Distribution System.

SEND FOR FREE BULLETIN!

ROME CABLE

CORPORATION

Dept. T, Rome, N. Y.

I want more information on the Rome TRIMLINE Primary Distribution System. Rush me my free copy of Bulletin RCP-790.

Name .....

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Company .....

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City ..... *State* .....

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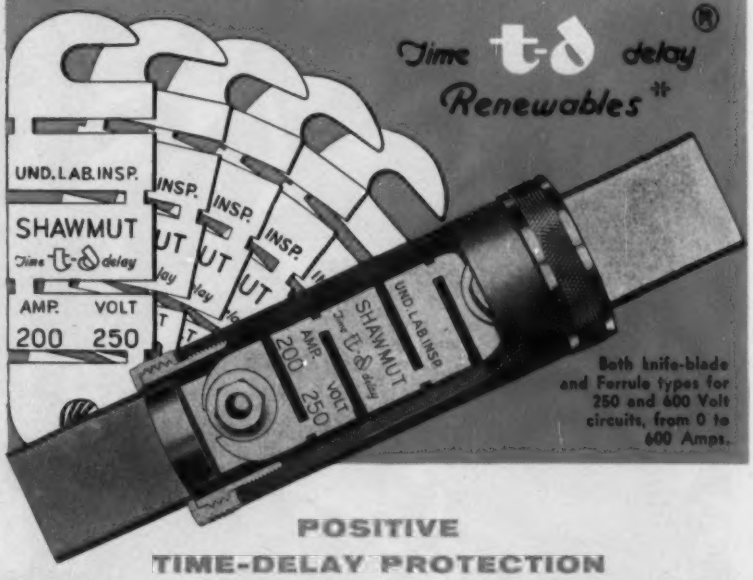
December 15, 1958

SAVE
WITH SILVER-PLATED FUSES
SHAWMUT
Time t-d delay Renewables*



POSITIVE
TIME-DELAY PROTECTION

Shawmut "t-d" Renewables have the best time delay characteristics of any renewable fuse. The t-d link gives maximum time delay protection in the higher current ranges as well as in the overload zone. Short-circuit operation is instantaneous, along with a reduction in the rate of rise of recovery voltage. The t-d link notches blow one after the other with rheostat-like action.

HIGH QUALITY - LOW COST

Precision-made. No soldered, welded or steel parts. Simple, sturdy, dependable. Easy to install, take apart or renew. Interchangeable links, renewable parts. Large silver-plated contacts. Adequate 2-way venting.

COMPLETELY RENEWABLE
FUSE OR LINK

Complete fuses and/or renewal links are available for either 250 or 600 V circuits; in ferrule ratings, from 0-60 Amps.; in knife-blade ratings, from 70 to 600 Amps.

Order now or ask for t-d Bulletin 500

*U.S. Patent No. 2,560,138 © The Chase Shawmut Co. 1958

t-d - "Awake At The Switch"

THE CHASE-SHAWMUT CO.
374 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS
Subsidiary of I-T-E CIRCUIT BREAKER CO., Philadelphia, Pennsylvania

Amp-trap® Tri-onic® t-d® Renewable C-O-T® TRIONET® and O-T TRIP

Records Management Program Accomplishes:
✓ Reduction of paperwork and space
✓ Planned facilities for active and inactive records
✓ Consolidation of related files
✓ Standardization of filing systems
✓ Training of personnel
✓ Retention and destruction plan
✓ Perpetual records control

Why a Records Management Program Effects Big Savings!

Unless your organization has already accomplished *all* of the factors listed above, it is likely that big savings are possible for you . . . *because any ONE of these factors may account for big savings!* And those listed above are only a few of the conditions which may be entailing immense cost, inefficiency and hampering service to your customers! The reason Remington Rand Record Consultants are so sure of saving you money is because of their know-how and the way they proceed.

First, they carefully explore and analyze *your* record-keeping problems and then submit recommendations to meet your most urgent existing needs. Only when these recommendations meet with your approval do they set in motion corrective procedures. You know in advance exactly what is contemplated and why it will pay off in your organization.

Today, every company, large and small alike, is confronted with an ever-mounting maze of records which must be efficiently managed and controlled to avoid heavy losses. Why not do something positive about it—Tampa Electric did with wonderful results! Remington Rand Business Services Department has *more* Record Consultants, *more* File Organizers, *more* years of experience (over 50) than any other company in the U.S.A. Send the attached coupon NOW for a Case History giving details of how Tampa profited from this fine service.

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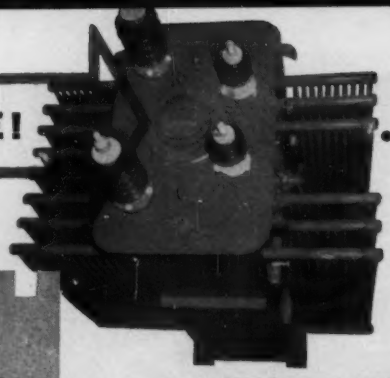
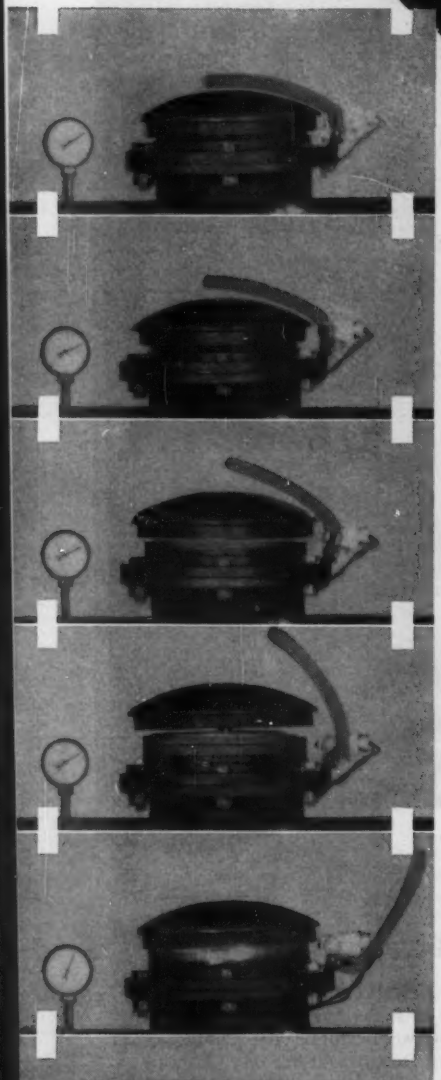


...NOW Standard

NEW *Positive-acting* PRESSURE-RELIEF DEVICE

- **FULLY AUTOMATIC**
- **SELF-RECLOSING**
- **SELF-RESETTING**



HIGH-SPEED CAMERA SHOWS OPERATING CHARACTERISTICS OF RELIEF DEVICE

These excerpts from a high-speed camera film illustrate both the speed and accuracy with which Pennsylvania's new pressure-relief device operates. In the top frame, 1, the pressure is approaching the predetermined setting (in this case, eleven pounds). In the second frame, the pressure limit has been reached, and the resulting operation is shown in frames 3 and 4. In the bottom frame, 5, the cover is starting to return to the closed position. *The total elapsed time for this sequence was 0.68 seconds.*

The new mechanical pressure-relief device developed by Pennsylvania Transformer engineers is completely automatic. It relieves internal pressure at a predetermined setting by temporarily breaking a gasket seal to permit gas or oil to escape around the cover . . . then *automatically* reseals itself so that the device is again fully effective.

NO PARTS TO REPLACE . . . NO RESETTING NEEDED

By eliminating the glass disc or diaphragm used on ordinary pressure-relief devices, this new Pennsylvania development does away with the time-consuming task of replacing parts. In addition, the need for periodic inspection has been eliminated. There is nothing to break . . . nothing to fall into the transformer . . . nothing to get out of alignment. Highly corrosion-resistant materials are used throughout: anodized aluminum for the cover and flange, and stainless steel for the shaft.

NO BREATHING TAKES PLACE AFTER RELEASE OF PRESSURE

An additional advantage over ordinary pressure-relief mechanisms is that the cover reseals itself while a low positive pressure still exists within the transformer. This definitely prevents breathing. Moisture *cannot* enter the transformer before, during or after the valve has functioned.

Dramatic proof of resealing effectiveness has been obtained from operating tests conducted with the relief device fully submerged in liquid. The inside of the valve remained *free of moisture.*

FULLY TESTED FOR DURABILITY, EFFECTS OF HEAT AND COLD

In addition to immersion tests, Pennsylvania's new pressure-relief device has undergone tests for conditions that far exceed any that are likely to be encountered in actual service. These include life tests of as many as *12,000 operations* with standard production

PENNSYLVANIA TRANSFORMER — PENNSYLVANIA

on all Pennsylvania Power Transformers

The pressure-relief device is shown in the closed position (right) and while operating (below). The upward movement of the cover causes the optional signal arm to pivot to an upright position.

models of the valve.

During life tests, the pressure-relief devices were intermittently operated at temperatures as high as 100°C., and also at −15°C. with a heavy formation of ice on the cover. To test the effect of hot oil, valves were immersed in 100°C. oil, with gaskets fully exposed, for as long as 96 hours.

VALVE OPERATES WITHIN ±½ POUND OF PREDETERMINED SETTING

At no time during the foregoing tests did the valves fail to operate within ±10% of the original setting. Following the tests, *all* relief devices were found to be pressure tight.

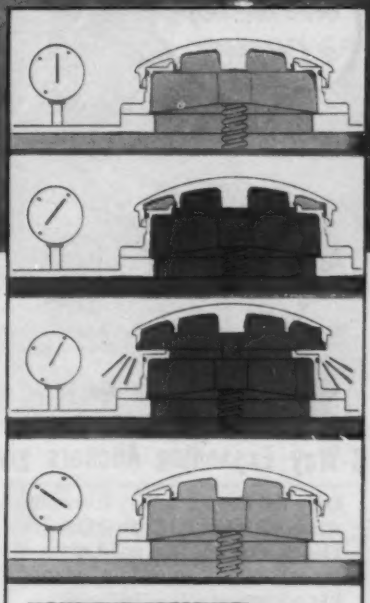
Pressure-relief devices supplied on Pennsylvania Power Transformers operate within the even closer tolerance of ±½ pound of the predetermined setting. This is assured by standard pretesting of production models. To further safeguard the transformer, the device relieves internal pressure within a split second after the predetermined setting is reached—as shown in the accompanying high-speed camera shots.

OPTIONAL ALARM AND SIGNAL ARM CAN BE RESET FROM GROUND LEVEL

Pennsylvania Transformer's new pressure-relief device is supplied with a combination alarm and signal arm, if requested. The signal arm, which is painted red, is easily seen from ground level when in an upright position. Resetting the signal arm—which can be done from ground level with a hot stick—also resets the alarm.

The new maintenance-free pretested pressure-relief device is available on all Pennsylvania Power Transformers with or without the combination alarm and signal arm. Contact Power Sales Department, Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

McGRAW EDISON



HOW THE PRESSURE-RELIEF DEVICE OPERATES

When the predetermined pressure at which the device is set to operate is exceeded, the spring force acting on the cover is overcome and the pressure, initially confined to the small "primary" area of the relief cover, escapes to the larger "secondary" area. This immediately multiplies the force acting on the cover and lifts it to its full open position, thus allowing the pressure to escape to the atmosphere. The spring force then resets and reseals the device while an internal pressure of approximately five pounds still exists within the transformer.

POWER TRANSFORMERS

Build lines to STAY with the CHANCE 8-WAY!
Give the Guy a CHANCE
This gives you a mole's eye view of what goes on below "see" level when a Chance 8-Way Anchor is dropped into a hole the same size as the base plate and expanded into solid earth all around the hole.
Mike the Mole UNDERGROUND OBSERVER

8-Way Expanding Anchors give you all 'round holding power

Only the Chance 8-Way Expanding Anchor, with its 8 rib-reinforced blades, expands into solid earth *all the way around* to form a pyramid-like square.

This design adds strength to expanding anchors. The pyramid enlarges the effective area of the anchor's holding power. Blades that expand side by side leave no wasted space between them—can be shorter, less apt to bend, and expand in a wide area of solid earth all around the hole.

Make the Chance 8-way *your* standard for the kind of guying you can install and forget. Available from your anchor distributor, in sizes from 60 to 200 sq. in. in area.

. . . and there are CHANCE ANCHORS for all other soil and guying conditions

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Books

All About Motors

Induction Motors Single-Phase & Polyphase. By C. S. Siskind. Published by McGraw-Hill Book Co, 330 West 42nd St, New York 36, N. Y. 381 pages, illustrated. Price $7.50.

Use of mathematics is held to a minimum in this very complete treatment of what is almost the standard type of motor used today. Principles, designs, starting, control, and application of both single-phase and polyphase motors are presented.

Advanced Mathematics

Applied Mathematics for Engineers and Physicists, Second Edition. By L. A. Pipes. Published by McGraw-Hill Book Co, 330 West 42nd St, New York 36, N. Y. 723 pages, illustrated. Price $8.75.

This text is designed for a general advanced mathematics course. It provides material on infinite series, complex numbers, vector and tensor analysis, and many other advanced mathematical tools. The tensor analsis is new to this second edition. Also added to the book is material on matrix algebra, Fourier methods, and Laplace transformers.

Heat Transfer Applications

Heat Transfer, Volume II. By Max Jakob. *Published by John Wiley & Sons, Inc 440 Fourth Ave, New York 16, N. Y. 523 pages, illustrated. Price $15.00.*

This is a highly mathematical treatment of several selected fields of heat-transfer applications. Heat exchangers, cooling towers, and the heat transfer in liquid metals are among the equipment or topics treated in the book. Its companion, Volume I, conveys basic fundamentals.

The book also has several supplements to Volume I. They are designed to bring up-to-date some of the material in this first volume which needs additions or modifications as a result of later developments.

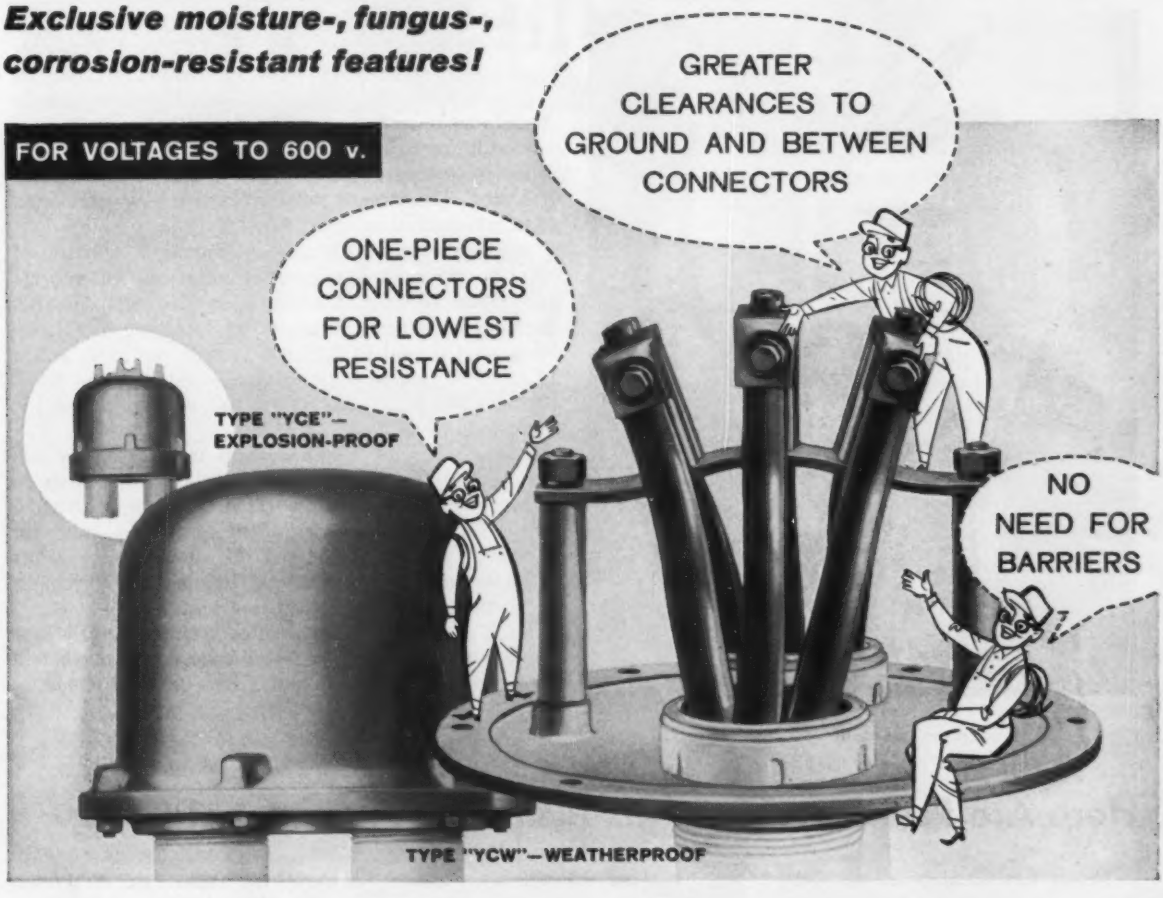
Books Recently Received

Handbook of Automation Computation and Control. Volume 1—Control Fundamentals. Edited by E. M. Grabbe, S. Ramo and D. E. Woolridge. Published by John Wiley & Sons, Inc, 440 Fourth Avenue, New York 11, N. Y. 972 pages, illustrated. Price $17.00.

Introduction to the Design of Servomechanisms. By J. L. Bower & P. M. Schultheiss. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, N. Y. 506 pages, illustrated. Price $13.00.

NEW! O.Z. PULL-N-SPLICE BOXES!
CONVENIENT·COMPACT·ECONOMICAL

Exclusive moisture-, fungus-, corrosion-resistant features!


FOR VOLTAGES TO 600 v.
GREATER CLEARANCES TO GROUND AND BETWEEN CONNECTORS
ONE-PIECE CONNECTORS FOR LOWEST RESISTANCE
TYPE "YCE"— EXPLOSION-PROOF
NO NEED FOR BARRIERS
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O.Z. Pull-n-Splice Boxes mark a significant advance in pull box construction!

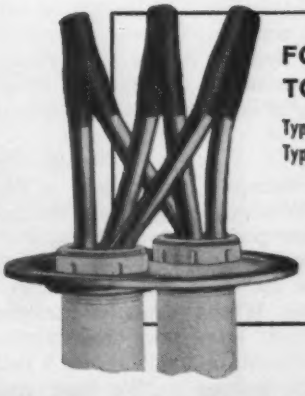
Their highly compact size saves *more space than ever!*

Their more efficient design means *new savings in installation time and labor!*

Their moisture-, fungus-, and corrosion-resistant features mean long, trouble-free service.

Still, with all their features, the new O.Z. Pull-n-Splice Boxes are *smaller* — and *cost far less* than conventional pull boxes . . . even late model *competitive* types! And, you get a bonus in high quality materials and workmanship so characteristic of *all* O.Z. products!

For complete information on these and the many other O.Z. products that mean more for you, call your local O.Z. distributor, or write to the company.



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Type "YPW" — Weatherproof
Type "YPE" — Explosion-proof

Deeper dome than "YCW" and "YCE". Furnished without connector panels. Insulated pigtail splices recommended.

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- CAST IRON BOXES
- CABLE TERMINATORS
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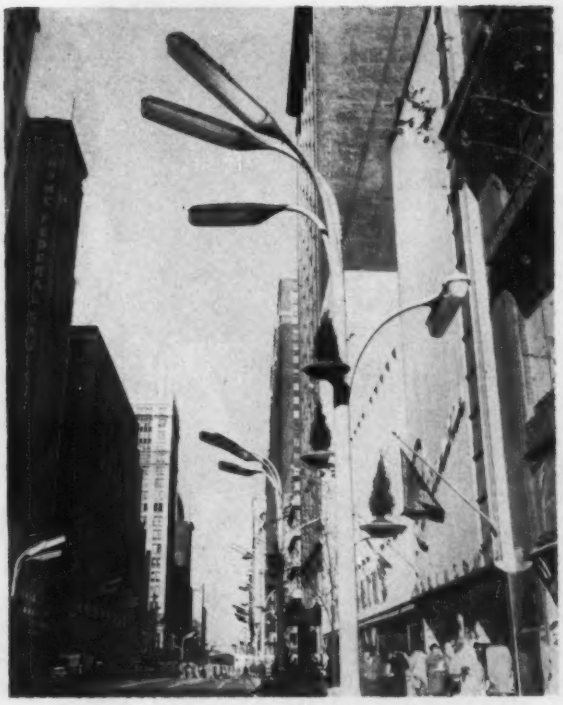

After the go-ahead signal from Earl Kribben, Chairman of the Board of the State Street Council, President Eisenhower, seated at his desk in Washington, pressed a golden telegraph key. This called into service a "beep" signal from the Vanguard satellite in outer space which, in turn, energized the entire lighting system. Three seconds later, State Street, Chicago, was a blaze of lights. The street's new street lighting system had gone into operation. (EW, Sept. 8, 1958, p 83)

Along a seven-block area, a 70-pole installation of 280 General Electric fluorescent luminaires will provide a maintained illumination level of approximately 14 ft-c. Each of the fixtures generates 55,800 lumens of light, for a total output of 223,200 lumens per pole, and a 15,624,000 lumens total for the system. About 20% of the total generated lumens are distributed on the sidewalk and the building fronts.

Radio receivers, which control the lighting system by interpreting and implementing "beep" signals from a central transmitter, are located in the base of each pole. The system turns on all lights at dusk, turns off a portion at midnight, turns off all remaining lights at dawn, and controls festoon lighting for Christmas decorations and similar purposes.

Each of the 36-ft high poles is topped with four fluorescent lamps. Three 20-in. wide flower bowls will contain seasonal flowers and plants the year round.

Here Are Four Developments Planned by Whirlpool for '59

Fewer new models in the 1959 line, increased sales of electric refrigerators, greater sales of gas appliances, and increased vitality in the kitchen division, were some of the developments recently forecast for the Whirlpool Corporation by its vice president in charge of sales, John A. Hurley.

Why? Listen . . .

1. "We are not introducing a complete line of RCA Whirlpool appliances because it is our policy to bring out new models only when we have sound technical or marketing justification for so doing. When we have a new development that represents a real improvement in product utility or operation we incorporate it in a new model."

Or if distributors and dealers say a new model is needed to fill a certain price bracket or meet a particular marketing need.

2. "We are introducing a complete line of electric refrigerators. First it gives us an opportunity to incorporate an important new development in refrigeration—the Jet-Cold shelf. Second, there is a marketing need for a square look. We will incorporate it in all our 1959 refrigerators."

3. "We introduced our first gas refrigerator in May of this year—right when the recession was in full bloom. Nevertheless, we will meet our goal for first-year sales. Our progress in the gas industry was particularly gratifying. Total factory sales of gas appliances are up $3.3 million over 9 months of 1957.

"We have great hopes for the further market penetration of our gas appliances. In 1959, our first full year in the gas refrigerator industry, we expect to increase our sales by 50%. We also expect to continue the rapid rate of growth begun in '58 in gas range sales."

4. "Our kitchen division made progress—a gain of well over 200%. Now with our own line of dishwashers, disposers, and built-in gas and electric ranges they should make even more progress."

Other developments for 1959:

- A complete line of dishwashers, the first of their own manufacture.
- Manufacture all their own products, except for one built-in range.
- Hold the line on pricing. One washer will carry a lower price; the combination washer-dryer will retail at the 1958 level, and refrigerators will have a minimum price increase.
- A sound and well balanced advertising program. The big changes will be the inauguration of a factory-sponsored newspaper campaign, and reduction in TV advertising.

NATVAR 400 in IRELAND

Field coils being inserted in stator by hand assembly operation. Natvar 400 Extruded Vinyl Tubing protects the leads.

A.C.E.C. manufactures single and 3-phase motors up to 20 HP. A large percentage of them are used on farms in Ireland for such applications as water pumps, milking machines, grain grinders and elevators.

Typical of these motors manufactured is this 3-phase totally enclosed surface cooled motor in an all Irish cast-iron frame, expertly machined and dynamically balanced to give smooth and vibration-free running.

A.C.E.C. (Ireland) Ltd. manufactures electrical apparatus in a modern plant in Waterford, the city on the southern coast where skilled craftsmen have been making the world-famous Waterford glass since the early nineteenth century.

Since these motors and transformers are used mainly in rural areas where servicing would be costly, they are built to high standards of reliability. Natvar 400 Extruded Vinyl Tubing is used to protect and insulate motor and transformer leads because of its excellent electrical and physical properties, particularly resistance to heat, oil, moisture and abrasion.

Natvar flexible electrical insulations have exceptionally good electrical and physical properties. You can depend on them. They are available throughout the free world, and are the same no matter where or when they are purchased.

Natvar

Natvar Products

- Varnished cambric—cloth and tape
- Varnished canvas and duck
- Varnished silk and special rayon
- Varnished—Silicone coated Fiberglas
- Varnished papers—rope and kraft
- Slot cell combinations, Aboglas®
- Isoglas® sheet and tape
- Isolastane® sheet, tape, tubing and sleeving
- Vinyl coated—varnished tubing and sleeving
- Extruded vinyl tubing and tape
- Styroflex® flexible polystyrene tape
- Extruded identification markers

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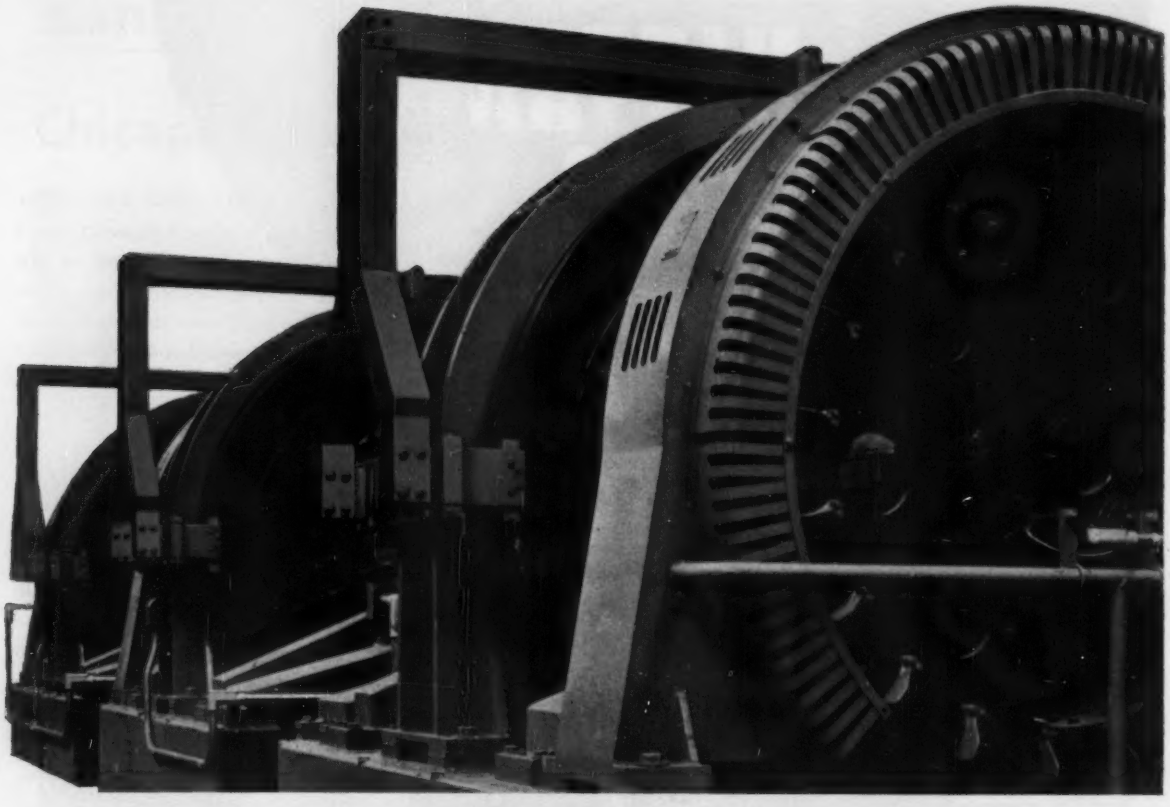


REVERE COPPER BUS BAR

used in two new 700-ft. long Udylite Bumper Plating Machines at

FORD MOTOR COMPANY

Aids in the production of a new, more durable, corrosion-resistant finish

Said to be the world's largest, the two Udylite plating machines are capable of turning out, per machine, 35 racks of bumpers an hour through 10 stages of a 3½ hour plating cycle. The electro-plating installation uses eighty generators, varying from 5,000 to 20,000 amps, which combined, provide enough power to light more than 150,000 bulbs of 100 watts each.

To carry that kind of a load from generator to plating machine, Revere Copper Bus Bar was used because of copper's superior electrical and heat conductivity. No other commercial metal of the same cross-section area approaches electrolytic copper in its ability to carry electricity, while its high thermal conductivity offers the greatest ease of cooling. This means a more compact installation with a resultant saving in space. Also, joints of high electrical conductivity are readily made by soldering, brazing or bolting. For information on Revere Bus Bar, as well as other Revere copper and brass mill products consult the nearest Revere Sales Office. You'll find it listed in the yellow pages of the telephone directory.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y

Mills: Rome, N.Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

RACK OF BUMPERS ready for immersion into plating solution at Ford Motor Company's plant at Monroe, Michigan. New process uses copper, white brass, nickel and chromium which results in outstanding durability.

Public Relations

Here's PEPCO's prescription for . . .

Relief from Three PR Headaches

Tree trimming, rights-of-way acquisition, and residential substations create more than their share of public relations problems. But planning, patience, and "reciprocal understanding" can solve these problems. Robert W. Wilson, vice president of Potomac Electric Power Co, explained his company's approach last month to utility executives attending the Southeastern Electric Exchange General Sales Conference in Atlanta, Ga.

Wilson emphasized that a utility must understand the customers' problems, as well as educate the customer to understand the utility's point of view. Once this climate of reciprocal understanding has been established, the fair-minded majority of people can be counted on for support.

Tree trimming problems come in two forms, said Wilson. Some involve local and state authorities, who often allow clearances that are less than adequate. Close work with authorities in deciding which types of trees to plant is one answer to these problems. A few utilities have even made consultants available to the authorities—with good results.

Customers who cause problems are those who expect free removal of any dead trees, whether or not they threaten the utility's lines, and the civic and business leaders, politicians, and personal friends who seek the aid of one of the utility's directors or officers whenever they have a tree-trimming problem, as well as the customers who won't keep their trees trimmed. Wilson's recommendations:

1. **Establish a definite company policy** for dealing with these problems.
2. **Tell all company employees about this policy** (article in employee magazine).
3. **Give special training to employees who handle tree-trimming requests.** This should cover the laws pertaining to cutting and removal of trees.
4. **Be sure customers understand the policy and reasons for it.** Advertisements

or bill inserts can explain that tree trimming insures reliable service.

5. **Try to adhere strictly to this policy.** Exceptions will mean problems.

Residential substations are more important to PEPCO than to most utilities. Its 643-sq-mi service area of downtown and suburban Washington includes 113 substations—34 of the residential type. These substations are carefully designed to conform to the architecture of neighboring homes.

After selecting a site, PEPCO obtains an option to buy it, conditioned on getting a zoning exception to permit construction. After examining pictures of neighboring homes, an architect draws plans of the substation to fit the neighborhood. Then the company lists all leaders of community groups and all property owners in the blocks immediately surrounding the site, and calls on them individually—explaining plans in detail. Here's PEPCO's approach:

1. **Tell them that use of electricity in the area is increasing rapidly,** and a new substation is needed to provide reliable and dependable service.
2. **Point out that there is no commercial property available in the area.**
3. **Explain why the particular site was selected.**
4. **Show them the architect's drawing and photographs of other substations.**
5. **Explain that all substation equipment will be fully automatic,** that no workmen will work regularly in the building. Also that the company spends extra money to enclose it fully so no noise will disturb neighbors.
6. **Assure them that there will be no interference to TV or radio reception,** and back this up with a letter from the chief engineer of a local station.
7. **Tell them that property will be well landscaped,** maintained at all times.
8. **Emphasize that substations don't harm values of adjacent property.**
9. **Invite them to visit existing residential substations to see for themselves.**

PEPCO doesn't stop there. After the substation is up and operating, maintenance crews make the rounds—cutting grass, trimming shrubbery, raking leaves, etc. Venetian blinds and curtains, and sometimes a vase of flowers, are painted on the Transite boards behind the windows. Lights beneath the windows are controlled by time switches to burn in the evening—from 6 to 10 on the first floor and until 11 on the second floor of two-story substations. At Christmas time PEPCO adds electric candles, also controlled by time switch, and wreathes on the doors. Wilson noted that this approach has won many friends and much favorable comment. "If you have a problem with your substations in residential areas, I can honestly say that our solution has worked very successfully."

Rights-of-way acquisition presents special public relations problems. County and state officials, regulatory commissions, and the land owners themselves must be told all the facts if the company is to obtain their full understanding. At the same time, public disclosure of plans before the company has contacted all the property owners might result in a temporary land boom, touched off by speculative real estate operators. Publicity personnel must be informed, since they must parry all questions from the press and others as diplomatically as possible without disclosing any information that will be harmful to the program.

Here are some public relations tools PEPCO uses in acquiring rights-of-way: The seller is permitted to use the land for agricultural purposes—grazing cattle or growing crops. He has permission to cross the company's property. He gets all timber cut from the right-of-way, to use or sell. PEPCO reserves the right of access through his property, and agrees to pay for any damage it causes to his property or to roads or bridges used for ingress or egress.

After construction of the line, company personnel make an effort to be friendly with neighboring property owners. They spray or cut weeds and brush fre-

quently. "Public relations is made much more difficult," said Wilson, "if customers have to plead with you to cut ragweeds or grass on your property."

Wilson offered a final suggestion: "Send your right-of-way men every year or two to visit informally with all the adjacent property owners. This will give you helpful information about the attitudes of these people toward your company and it will also bring to light any special complaints." He recommended that these men leave a calendar or leaflet with the telephone numbers of the area service building and general offices, and whom they should call if they observe trouble on the lines or if they have any complaints or requests.

Net Plant: A New Yardstick for Utility Growth

Finance

A survey of 110 electric utilities completed recently by the Wall St. investment firm of Goodbody & Co has introduced a new tool for measuring comparative growth. The new yardstick is net plant—the figure obtained by deducting the depreciation reserve from the gross plant account.

In the table below, the top 25 companies of the sample considered in the study are ranked in order of net plant growth. On the left are leaders for the period 1953 through 1957. On the right are the top 25 based on estimated net plant

Top 25 Electric Companies in Net Plant Growth

(from a 110-company survey)

COMPANY	1953–1957 NET PLANT DEC. 31, 1952 (thousands)	NET PLANT DEC. 31, 1957 (thousands)	PERCENT INCREASE
Savannah E&P	$16,166	$39,863	146.6
Pacific P&L	102,124	251,695	146.5
Tampa Electric	44,149	101,558	130.0
Missouri PS	23,625	52,571	122.5
Tucson GEL&P	21,815	45,819	110.0
Florida Pwr	96,740	202,361	109.1
El Paso Elec	24,354	50,876	108.9
Central Louisiana El	32,622	67,511	106.9
California EP	54,999	113,632	106.6
Houston L&P	150,616	306,580	103.6
Arizona PS	75,231	149,288	98.4
Florida P&L	182,922	353,803	93.4
Kansas G&E	61,840	119,196	92.7
Atlantic City El	62,945	121,246	92.6
Long Island Ltg	210,368	398,301	89.3
San Diego G&E	96,835	181,842	87.7
Iowa EL&P	45,287	84,659	86.9
Columbus & S. Ohio	110,469	201,796	82.7
Portland GE	89,151	162,229	81.9
Delaware P&L	91,899	166,574	81.2
South. Indiana G&E	33,767	60,710	79.8
Texas Utilities	324,933	575,349	77.1
PS of Indiana	207,226	363,880	75.6
South Carolina E&G	100,338	175,502	74.9
PS of New Mexico	28,999	50,625	74.6

COMPANY	1958–1960 NET PLANT 1960 (Est.) (thousands)	PERCENT INCREASE (Est.)
Arizona PS	$239,052	60.1
Florida P&L	538,278	52.1
Tucson GEL&P	69,244	51.1
Tampa Electric	152,790	50.4
Houston L&P	446,043	45.5
Central Illinois Lt	145,096	44.4
Gulf States Utilities	381,147	44.4
Savannah E&P	57,258	43.6
Potomac Elec. Pwr	372,702	43.3
Missouri PS	75,100	42.9
PS of New Mexico	71,375	41.0
Central Hudson G&E	148,764	40.5
Southern Co	1,323,843	39.3
Florida Pwr	279,967	38.4
Idaho Pwr	271,797	38.4
Consumers Pwr	997,163	38.3
California EP	156,693	37.9
Iowa-Illinois G&E	124,053	37.6
Central Louisiana El	92,621	37.2
Public Service E&G	1,282,752	35.5
El Paso Electric	68,287	34.2
Wisconsin PS	150,373	34.0
Washington Wtr Pwr	238,922	33.9
Duke Pwr	540,515	33.1
Pacific P&L	334,828	33.0

growth for the years 1958 through 1960. Goodbody chose to measure growth in terms of net plant additions, rather than gross plant additions, since regardless of the gross construction program: "unless a utility expands its net plant each year, it is really going behind." The study also notes that most regulatory commissions use the net plant account as their starting point in evaluating utility property for rate-making purposes.

The study includes comparisons of net plant growth for the period Dec. 31, 1952 to Dec. 31, 1956 and a separate comparison for the year 1957, based on known data. Goodbody & Co also estimated construction for 1958, 1959, and 1960 based on company estimates, prospectus data, and other published information. Average net plant increase for the entire period came to about 9% a year, compounded, for the group of 101 utilities where information was available. The average growth rate for the four years 1953-56 was 41.2%, and the 1957 average was 10.2%. Estimated average for the three years 1958-60 is 26.2%.

The study's chief value is as a comparative measure of expansion, based on the average for the group. Goodbody & Co warns that the 1958-60 estimates cannot be considered an absolute chart of utility growth ahead. For one thing, the study emphasizes, the estimates are subject to change. For another, a utility's plant additions for that three-year period must not be evaluated in isolation. A company may have just completed a heavy construction program in 1958, or it may be just starting one. There is a growing tendency for utilities to build larger plants than they immediately need, and to share the output for a year or two with neighboring utilities. This makes the construction programs of individual utilities vary widely from year to year, and necessitates more detailed study before drawing hard and fast conclusions.

"All the percentages do is indicate a relative trend or ratio," the study concludes. "The rest must be arrived at via further study and investigation. It is obvious, however, that where a utility's percentage figures are above the averages of the 101 companies for this period, this may be a clue to above average growth. . . . Rapid growth carries with it a challenge to translate this growth into per share earnings. If this cannot be done, there must be some good reason. The analyst studying the figures of comparative growth will need to use the ratios we have computed as a starting point to find the answer."

Copies of the complete study, entitled "Comparison of Increases in Net Plant for 110 Electric Utility Companies," are available on request from T. W. Locke, Goodbody & Co, 115 Broadway, New York 6, N. Y.

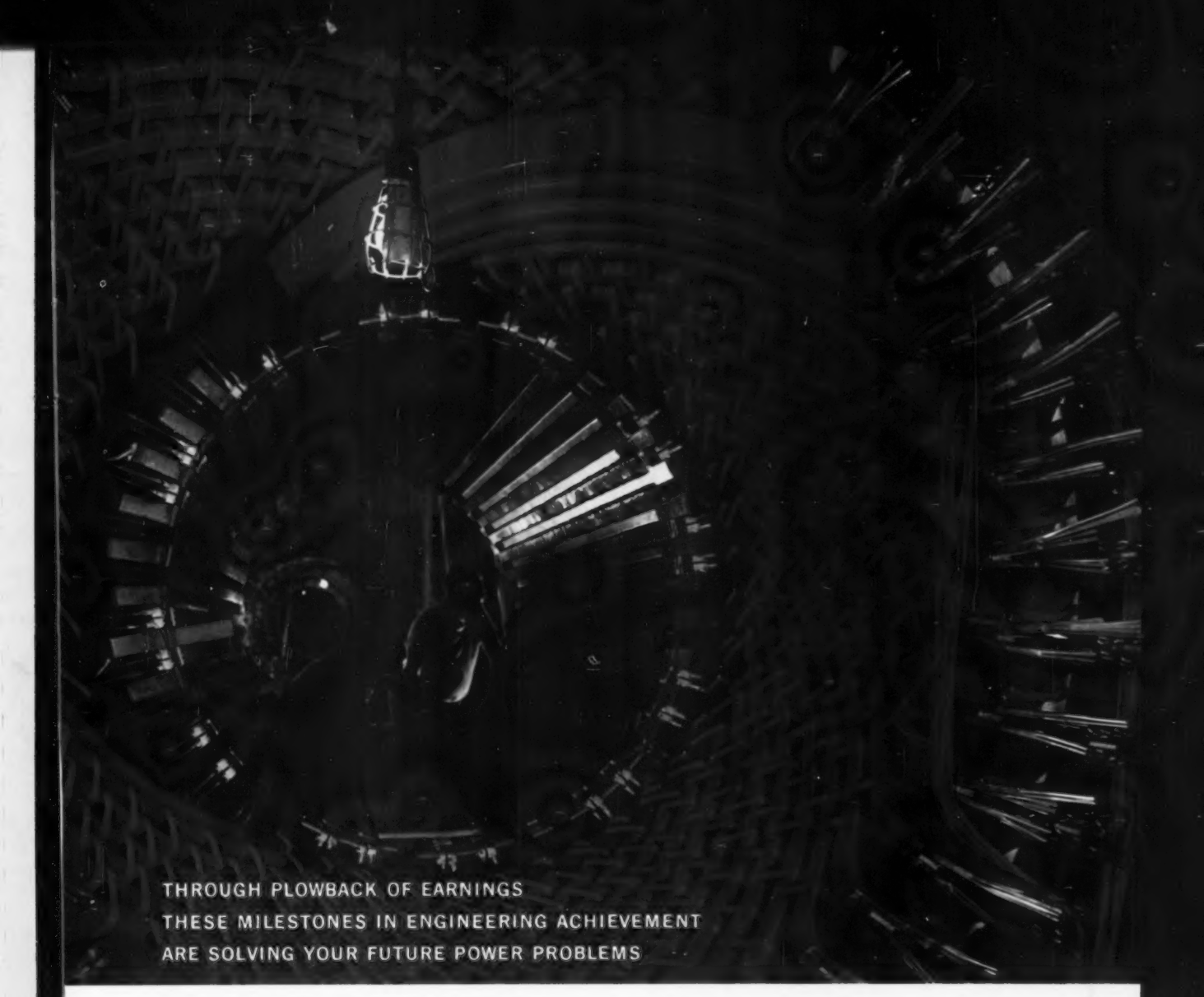
EMPLOYEE EDUCATION

A self-study service in management for utility supervisors is available from Elliott Service Co. Designed to show the supervisor the importance of his job and give him specific answers to recurrent job problems, the course is composed of 40 four-page feature issues, six managerial skill studies, and six data books to aid the supervisor in more effective planning.

Typical topics of feature issues are: "How to say 'No'," "When to put it in writing," and "When is a promise a promise?" Managerial skill studies include "Skill in Managing Your Time" and "Skill in Judging People." Further information on the service, "Management Information for Public Utility Supervisors," can be obtained by writing Ralph T. Soule, Elliott Service Co, Inc, 30 North MacQuesten Parkway, Mount Vernon, N. Y.

UTILITY FINANCING

Late check on 1958 financing indicates electric utilities will probably hit a $2.3 billion total before the year is out. Breakdown is as follows: Bonds—$1.7 billion; preferred—$311 million; common—$294 million.



THROUGH PLOWBACK OF EARNINGS
THESE MILESTONES IN ENGINEERING ACHIEVEMENT
ARE SOLVING YOUR FUTURE POWER PROBLEMS

Westinghouse builds world's ten largest tandem-compound turbine-generator units

The challenge to America's electric utilities has grown through the years to the point where the builders of power generation equipment must find the answers not only to today's load growth problems, but to those of the years ahead as well.

As the capacities of turbine-generator units have had to increase, so has the complexity of the machines. Building larger, more economical equipment has become the index of a manufacturer's research and engineering ability.

In answer to this challenge, Westinghouse is again proving its leadership in the field by designing and building the most powerful tandem-compound turbine-generators the world has ever known—units capable of producing as much as 325mw! Two of these 3600-rpm tandem-compound units are now in service, each with a capacity of 250mw. Eight more are shipped or on order, with ratings of 250, 275, and 325mw.

YOU CAN BE SURE...IF IT'S **Westinghouse**

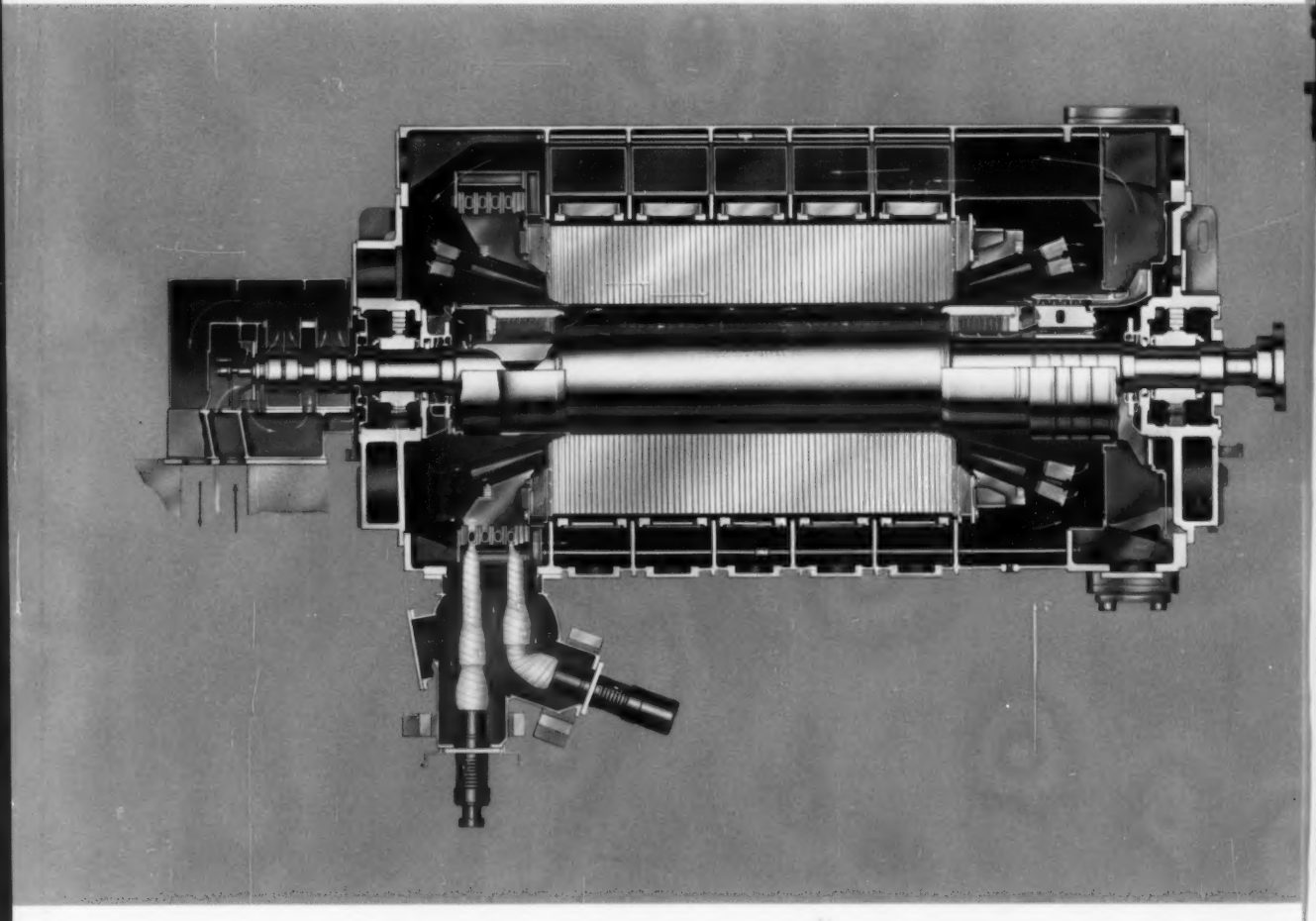
WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS"
CBS TV MONDAYS

HELPING YOU TO MEET TOMORROW'S LOAD GROWTH NEEDS . . .

Westinghouse engineering and research have made these tremendous capacities practical, efficient

In 1934, when Westinghouse built the first large 3600-rpm single-shaft turbine, there began a revolution in turbine and generator design which today permits the building of gas-cooled generators in ratings of over a half million kva in a single 3600-rpm unit.

Two advances were responsible for such high-capacity generating equipment—Inner-Cooling and Thermalastic insulation.



YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

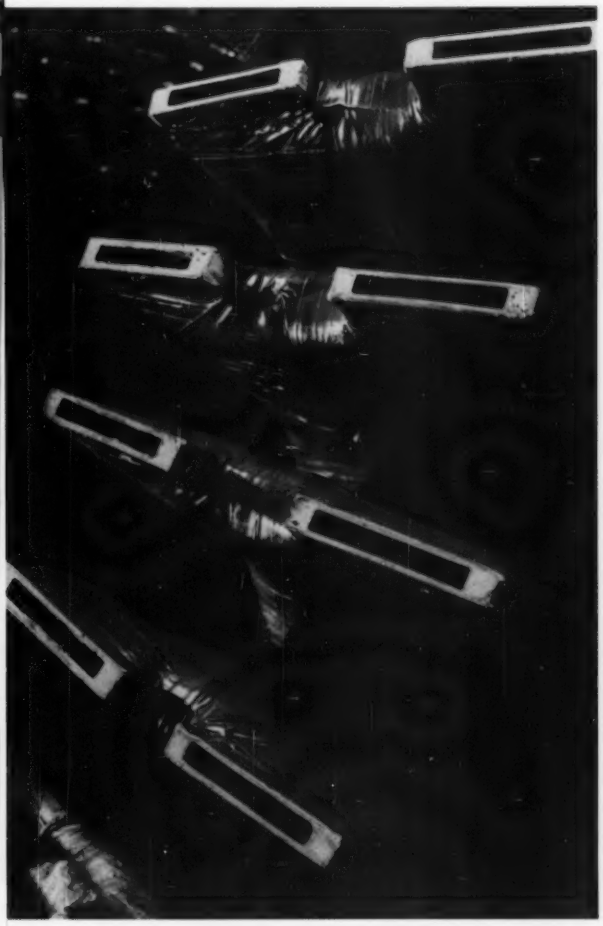
FOLD OUT

INNER-COOLING

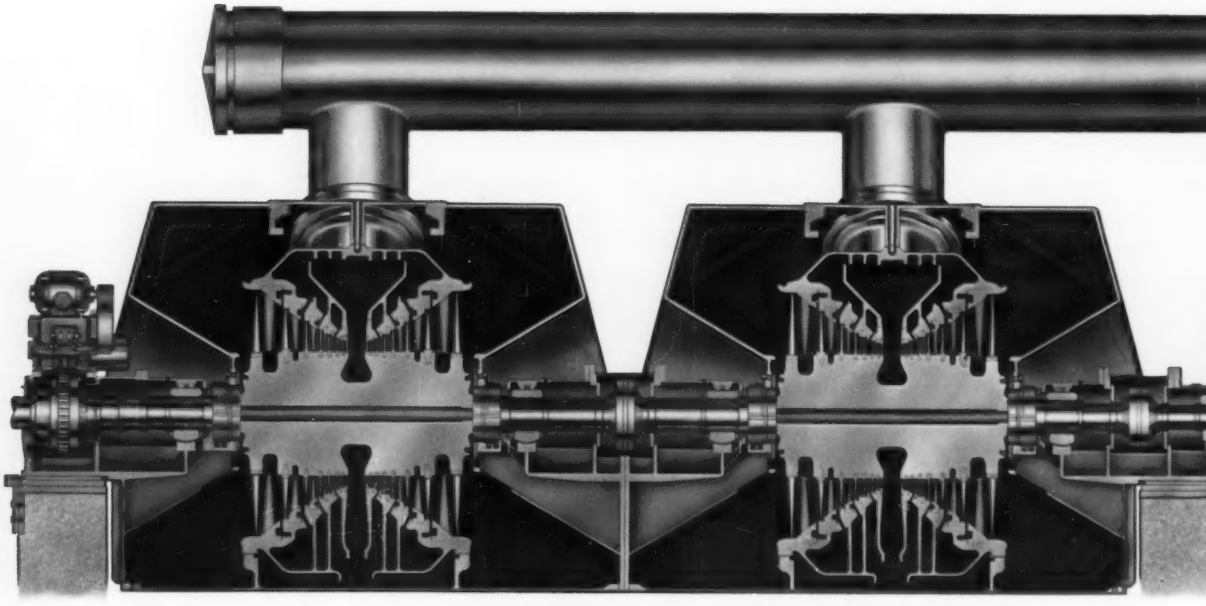
The Westinghouse-pioneered Inner-Cooling system has made it possible to circulate hydrogen through the inside of the rotor and stator windings, providing intimate contact with the conductors where the heat originates. It is by far the simplest and most effective method of cooling ever devised. Already proved in extensive service, Inner-Cooling has doubled single-shaft ratings over conventionally cooled units, and it has greatly reduced the size and weight of equipment.

THERMALASTIC® INSULATION

Thermalastic insulation, known as the "insulation with a memory," has a unique molecular structure which permits expansion and contraction of the windings without injurious deformation throughout the life of the machine. Voltage endurance tests prove that Thermalastic insulation has a one thousand-to-one advantage. Operating voltages cannot get through the fish-scale barrier of large mica splittings, which are locked in a memory-type elastic bond.



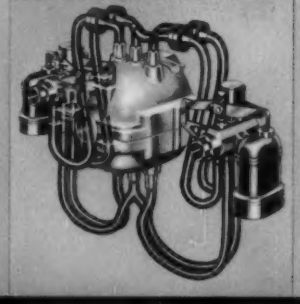
These important steps to greater generating capacity are paving the way to the ratings needed to meet future load growth with the greatest possible efficiency and economy



FROM RESEARCH LABORATORY TO POWER STATION . . .

These exclusive Westinghouse "firsts" are now standard features of the world's largest tandem-compound turbine-generators

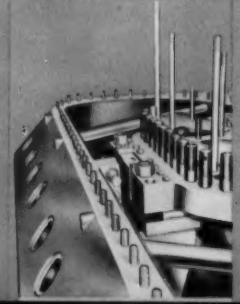
Two Separate Steam Chests: Simplifies turbine casing and steam chest construction, minimizes thermal stresses and permits inherently stronger pressure containers. The two chests, located at the sides of the casing, are connected to the casing only by flexible pipes and permit complete functional testing without excessive load reduction.

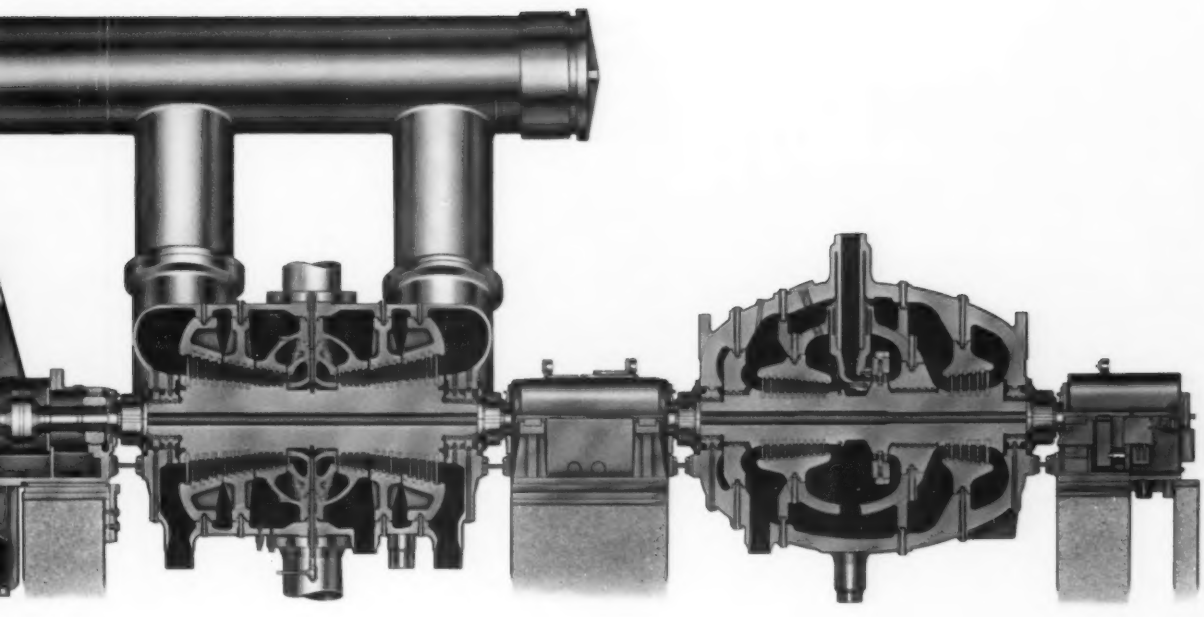


Side Entry Roots in High-Pressure Element: This is the highest strength fastening yet developed.

Side Entry Roots in Low-Pressure Element: The curved side entry fastening provides great strength and transverse and longitudinal rigidity.

Stationary Blade Ring Supports in Low-Pressure Element: Designed to expand concentrically with the rotor without imposing stress on the casing. The outer casing is subjected only to vacuum temperature.

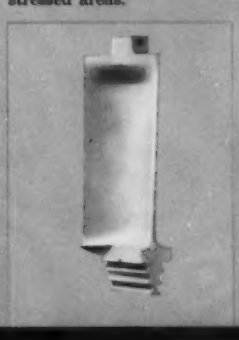




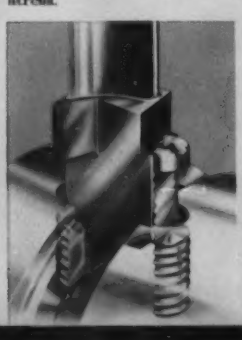
The results of Westinghouse research and engineering are embodied in the above 325-mw, 3600-rpm reheat turbine.

Below are outlined but a few of the typical features of the industry's most advanced turbine-generators—features which put them years ahead in ability to meet demand with maximum economy and efficiency.

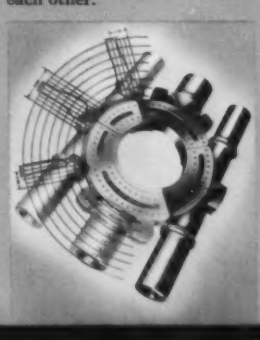
New Type of Blade Root in Intermediate Pressure Element: Side entry fastenings similar to those in the high- and low-pressure elements are used effectively in highly stressed areas.



New Blade Locking Device in Intermediate Pressure Element: For single and double tee root blades, a new last blade locking device greatly reduces rotor stress.



Separate Nozzle Chamber Construction: This design advance minimizes thermal stresses. The chambers are welded to the inner casing by flexible sleeves, allowing them to expand and contract independently of both the casing and of each other.



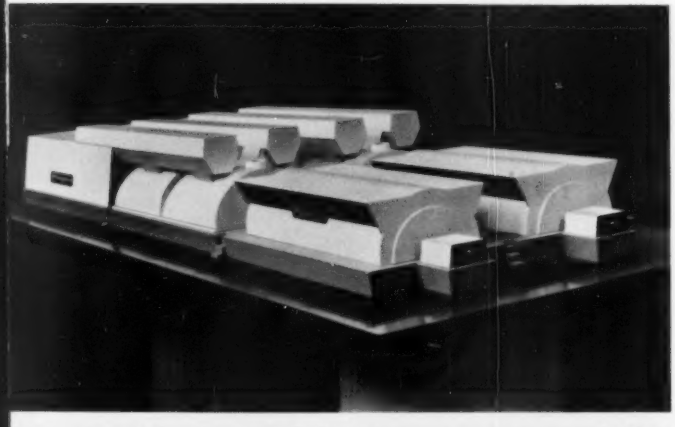
Mass Flow Cooling: Permits the insulating and cooling effect of steam to limit temperature gradients and to control the temperature at which various parts of the turbine operate. Minimum wall thicknesses and bolt sizes provide maximum reliability and minimum maintenance.

Acceleration-Responsive Governor — the Accelerometer: An auxiliary governor which gives instant response independently of rotor speed. This response is based on acceleration, replacing the older speed-responsive governor. With the large capability-inertia ratio of 3600-rpm tubine-generator units, the use of such a highly sensitive governor protects the unit from dangerous overspeed should the electrical load be lost.

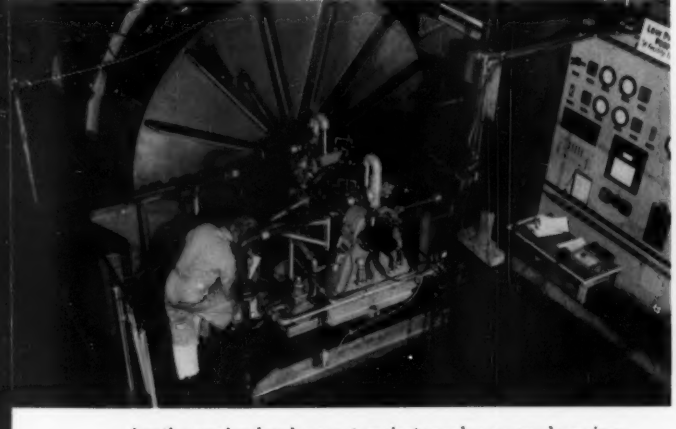
THROUGH PLOWBACK OF EARNINGS . . .

research in action . . . the turbine of 1970 is a laboratory reality!

In the Steam Division's Development Laboratory, Westinghouse is uncovering the answers to questions of the future before a need becomes an emergency! A new peak of efficiency for the 1970 turbine, model shown below, will be assured by steps being taken now, and over the next 12 years.



Development engineers are now evaluating a new Westinghouse alloy that may be the metal of the future. For example, at 1200°F, the tensile strength is a phenomenal 100,000 psi. Damping characteristics are also excellent. After exhaustive tests, Nivco alloy will become another Westinghouse "first."



Another major development project revolves around a unique L-P turbine test facility. Westinghouse engineers are using this $1,000,000 test tool on numerous combinations of new designs, recording the performance of low-pressure components under varying conditions.

One giant stride is being accomplished in the 325-mw supercritical turbine now being built. This unit will be the world's most efficient turbine and will use the highest temperature and pressure steam in history—5000 psi at 1200°F.

These and many more Westinghouse developments —some already accomplished and more yet to come—are your assurance of the best in research and engineering quality. They are your assurance of a better electrical future. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

JI-50606

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Ask your Westinghouse representative about the new turbine-generator film, "What It Takes."

Cohn, Williamson Elected VPs of KPL

Byron S. Cohn of the Topeka Division and John G. Williamson, Salina Division, have been elected vice presidents of The Kansas Power & Light Co.

Cohn has been manager of KPL's electrical department and chief engineer since 1938. He is in charge of engineering, construction, and operation of the company's electric generating stations and transmission and distribution systems. He joined the utility in 1930 as electrical engineer.

Williamson is general manager of KPL's natural gas department. He has had more than 20 years experience in natural gas production, transmission, and distribution.

He was elected to the company's nine-man board of directors in May of this year.

COHN WILLIAMSON

Chance Ups LeVee to Vice President

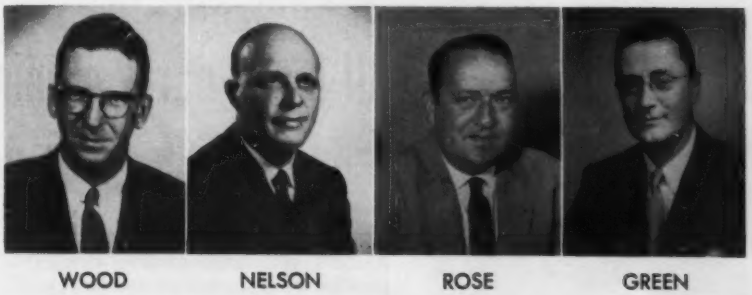
A. B. Chance Co has named Clarence H. LeVee vice president of engineering, in charge of all product engineering research, development and design.

For the past two years he has been director of engineering and research for Hubbard & Co. Before that he was a power consultant for J. G. White Engineering Corp, where he was responsible for all electrical transmission and distribution installations, both civilian and military, on Formosa.

He has also had experience in the field of utility operations and construction, consulting engineering, and utility sales.

New President and Vice Presidents Named at Enjay

The Enjay Co Inc, New York, has announced the election of a new president and three new vice presidents. John E. Wood, III, general manager, chemical products dept, Esso Standard Oil Co, becomes president of Enjay. The new vice presidents are Karl J. Nelson, Harold J. Rose, and A. Donald Green.



WOOD NELSON ROSE GREEN

Wood, who has been with the company since 1939, was appointed assistant general manager of the chemical products department in 1955 and general manager in 1956. Before that he headed the chemical products division at Esso's Baton Rouge Refinery for two years.

Nelson has also been with the company since 1939, serving as a chemical engineer, product coordinator, product manager, and sales manager. He has been head of Enjay's sales department since July.

Head of Enjay's products management department since August, Rose joined Esso as a research chemist at the Baton Rouge Refinery in 1942. After work at the Research Center in Linden, N. J., he was coordinator of chemicals research.

Green, with the company since 1930, has headed Enjay's new projects department since September. He has worked at the Baton Rouge Refinery, the Linden Research Center, and as deputy coordinator of chemicals research for Esso.

New Alcoa 390-490 Series Extruded Parallel-Groove Clamps are More Compact, Easier to Apply

COMPETITIVE CLAMP

ALCOA CLAMP

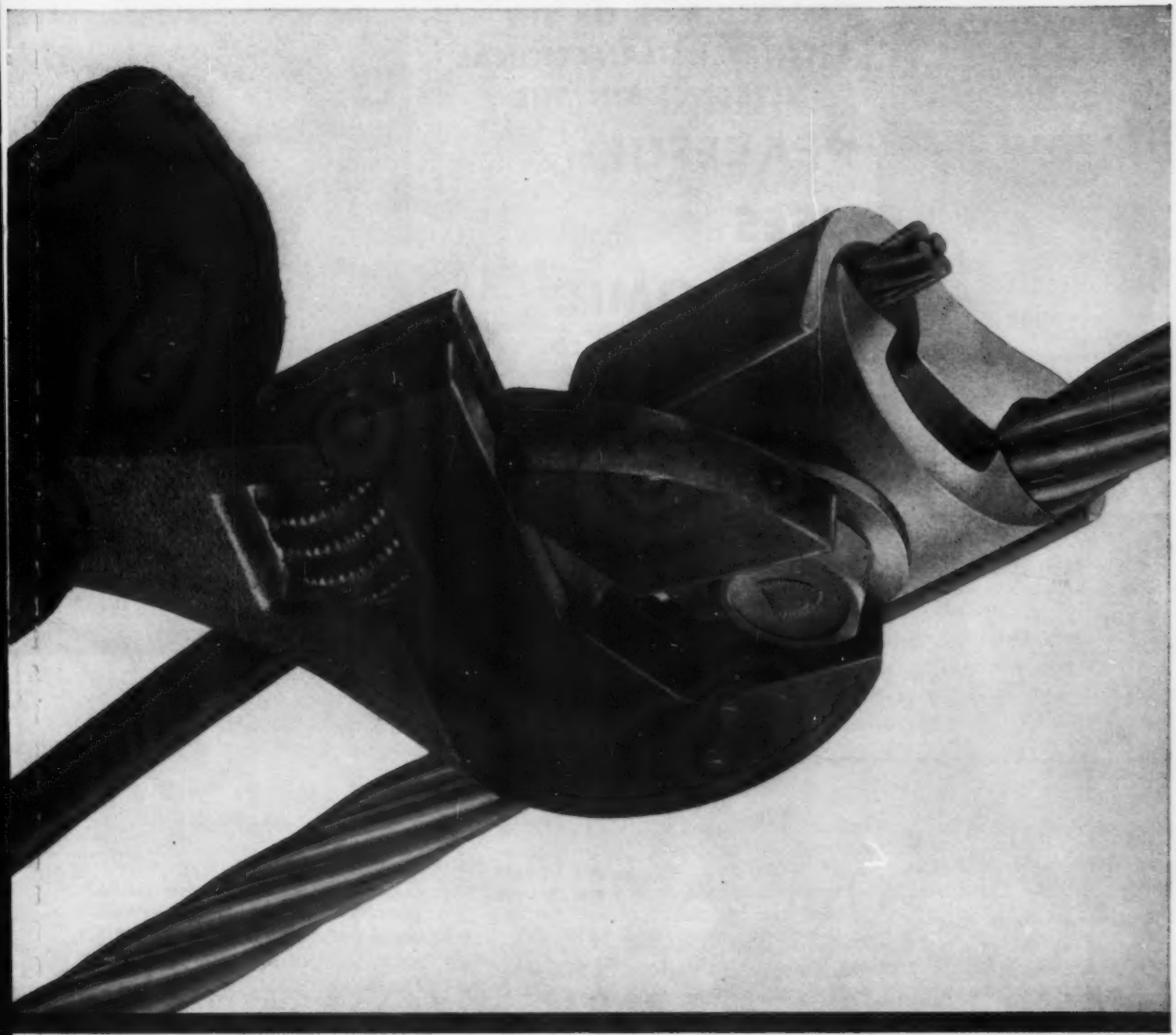
All loose parts eliminated... reduced bulk gives neater appearance

Now you can get the benefits of Alcoa's universal groove design previously announced for heavy-duty clamps. Two new Alcoa single-bolt, distribution and service-drop-type extruded clamps* accommodate ACSR and stranded aluminum sizes #6 to #2 7/1 (Catalog 490.0) and #6 to 2/0 (Catalog 396.6).

Top and bottom parts of the new clamps are Alcoa® Extrusions—made strong, solid and dense from heat-treated alloy. Grooves are specially treated and coated

*Patent applied for

REDUCED BULK in Alcoa's new 390-490 series clamps makes them easy to tape; gives a neat, more compact appearance on the line, makes them easier to store and handle.



to provide low-resistance surfaces. All parts are aluminum to equalize expansion, eliminate corrosion. The new extended lip prevents cap from turning when being applied.

Other benefits you get with these economical new Alcoa clamps are easier application and handling. Loose parts have been eliminated. These clamps can be applied "hot." Bolts are anodized to reduce thread friction. A supply of these clamps on your trucks will cover most distribution applications. Simplified ordering and stocking, and fast delivery, also save you money.

When you specify Alcoa parallel-groove clamps, you also buy the experience gained during a quarter of a century of manufacturing clamps and other accessories for aluminum . . . plus years of extensive laboratory testing. Ask your Alcoa representative to show you samples of these clamps. Call him today for full information, or write Aluminum Company of America, 2306-M Alcoa Building, Pittsburgh 19, Pennsylvania.

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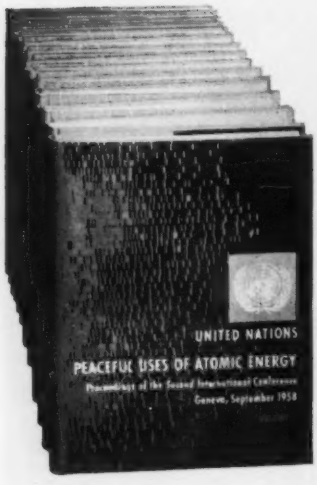
ELECTRICAL CONDUCTORS AND ACCESSORIES
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

ALCOA THEATRE
Fine Entertainment
Alternate Monday Evenings



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Hansen Made a Chief Engineer at AC

Ellis P. Hansen has been appointed chief engineer of Allis Chalmers Manufacturing Co steam turbine department.

He joined Allis-Chalmers in 1935 after positions with A. O. Smith Corp and Armour & Co. He became engineer-in-charge of the steam turbine department's mechanical design section in 1956 and assistant chief engineer in 1957.

Correction

J. R. North has been elected president of Commonwealth Associates Inc, not Commonwealth Services, as incorrectly reported in the December 8 issue, page 106. Commonwealth Associates is a subsidiary of Commonwealth Services Inc. of which W. B. Tippy is president. North joined Commonwealth Associates in 1924.

PERSONAL BRIEFS

Duke Power Co has made **G. G. Mattison** manager of operational engineering.

Alabama Power Co has made the following appointments: **J. O. McKinstry** district manager Huffman District in the Birmingham Division; **J. C. Castleberry** Birmingham Division's supervisor—transportation, and **R. B. Booth** head-of-section-plant in the accounting department.

Six week delivery
Designed to your specs
Incorporates your components
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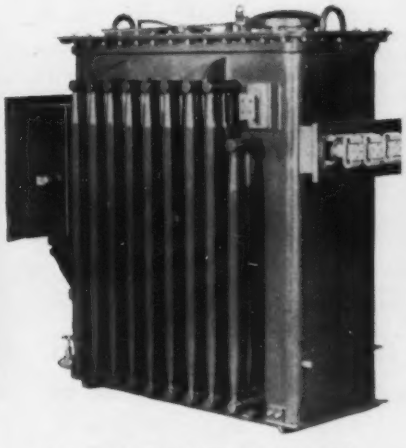
Oil filled with primary switch and protector type throat on one side instead of opposite ends to permit installation in an existing vault.



Askarel filled with usual arrangement of high and low voltage terminations for installation in a limited space.

Oil filled with primary switch and protector type throat on one side with "pancake" type radiators to permit ease of cleaning and maximum cooling.

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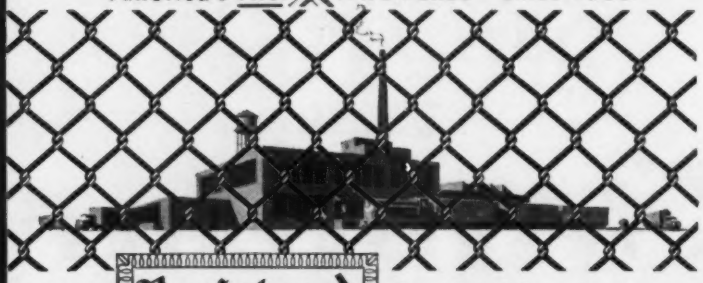

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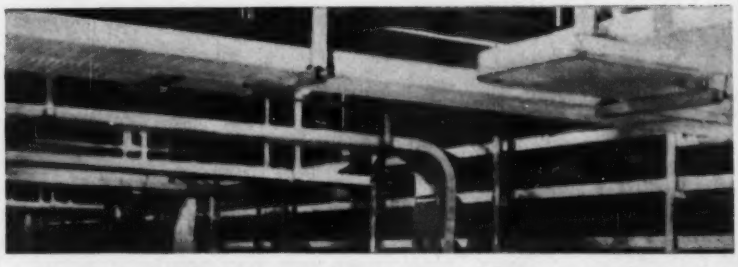

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Philco Corp has created a special department for sales of its home appliance products to mobile home manufacturers. **John L. Utz,** general manager of special market planning, and **Robert C. Digges,** manager of special sales, will head this department.

Nuclear Science and Engineering Corp, Pittsburgh, has appointed **Eugene M. Zuckert** chairman of the board.

Newly organized Cobra Co which will provide deep-injection preservative treatment for utility poles and other timber products in the U. S. has elected these officers: **Robert G. Duncan,** president, and **J. C. Strasbourger,** executive vice president. Both officers hold similar positions in Mitchell Maintenance Co. Headquarters of the new company will be in Muncie, Ind, with an office in New York.

The International Association of Electrical Inspectors has elected **C. B. Grauer** president of its southern section.

The National Electrical Manufacturers Credit Group of the National Association of Credit Management has appointed these new officers: **Stanley Elmer,** Columbia Cable & Electric Co, chairman; and **Thomas F. O'Donnell,** Federal Pacific Electric Co, vice-chairman. **Bernard Gilligan,** Ward Leonard Electric Co; **Kenneth W. Grace,** Edwards Co, and **Alva Stewart,** General Cable Corp, were named committeemen.

The American Institute of Electrical Engineers has raised the following eight members to the grade of Fellow: **Carl H. Bjorquist,** assistant chief of design, Bonneville Power Administration; **Theodore W. Stringfield,** head electronics and communications design, Bonneville Power Administration; **Albert Hansen, Jr,** manager d-c advance engineering, low voltage switchgear department, General Electric Co; **Donnell D. MacCarthy,** manager of voltage regulator engineering, power transformer department, General Electric Co; **C. Russell Mason,** application engineer, user industries sales department, General Electric Co; **William C. White,** provost and vice-

100,000 KW power plant addition uses
CHASE ANTIMONIAL ADMIRALTY TUBES

Workers insert first of 8,380 1" O.D. Chase Antimonial Admiralty Tubes used in power plant condenser system. This is part of company's $21,000,000 expansion program to be completed in 1960.

There are nearly 50 miles of Chase Antimonial Admiralty Condenser Tubes in this new 100,000 KW generating unit of a prominent Southwestern power company.

Chase Antimonial Admiralty was chosen because of its favorable cost comparison as well as its enviable "in-service" record. Since Antimonial Admiralty was developed by Chase in 1935, over 125 million pounds of tubes have been put into service in thousands of installations, giving excellent service.

Chase offers unsurpassed technical assistance . . . *first-hand* technical assistance that comes from producing condenser tubes for all types of installations, including raw sea water. For details, contact your Chase representative. Or write Chase, Waterbury 20, Connecticut.

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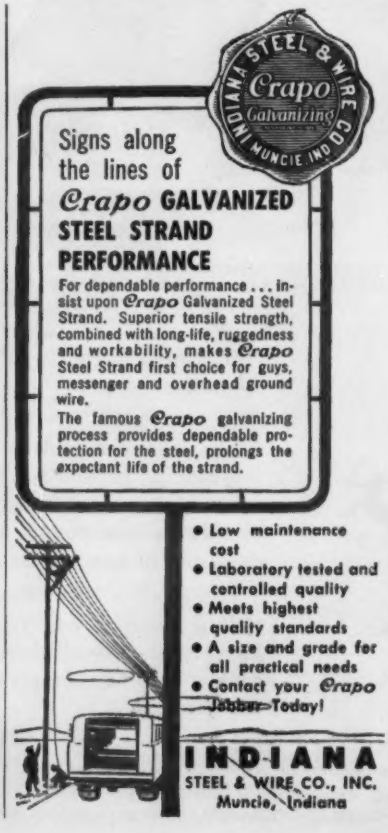

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INDIANA STEEL & WIRE CO., INC.
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president of Northeastern University, Boston, Mass.; **Robert R. Wagstaff,** chief engineer, United Engineers Constructors, Inc, and **Myron S. Wilson,** manager of engineering, electrical instruments, instrument department, General Electric Co.

The Engineers Joint Council has appointed **Dr Gene M. Nordby,** head of the department of civil engineering at the University of Arizona, to its committee on engineering sciences.

Westinghouse Electric Corp has made **Kenneth J. Culp** manager of marketing for the atomic fuel department.

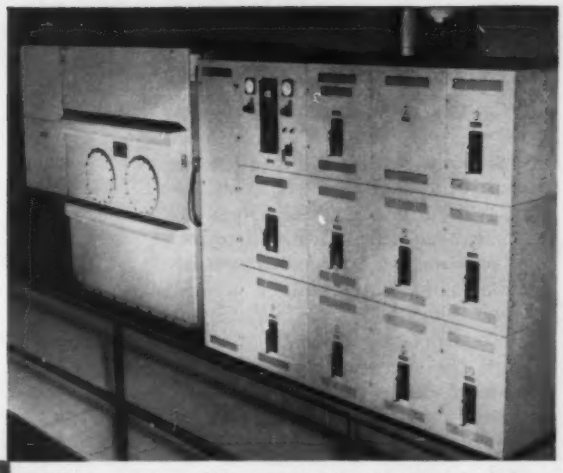
Union Carbide Corp has recently made these appointments: **Leo I. Dana** vice-president—technology, and **David Swan** vice-president—research for Linde Co, division of Union Carbide.

Institute of Radio Engineers has elected **Ernst Weber,** president of the Polytechnic Institute of Brooklyn and president of the Polytechnic Research and Development Corp, president for 1959. **Donald B. Sinclair,** vice president and chief engineer of General Radio Co, West Concord, Mass., will become vice president. **Ferdinand Hamburger, Jr,** professor of electrical engineering at Johns Hopkins University, and **Bernard M. Oliver,** vice president of research and development, Hewlett-Packard Co have been elected directors for a 1959-1961 term. **Richard D. Thornton,** assistant professor of electrical engineering, Massachusetts Institute of Technology, has been given the 1959 W. R. G. Baker Award for his paper, "Active RC Networks", which appeared in the 1957 issue of IRE Transactions on Circuit Theory. **Franklin H. Blecher** of Bell Telephone Laboratories, Inc, has been named recipient of the 1958 Browder J. Thompson Memorial Prize Award for his paper, "Design Principles for Single Loop Transistor Feedback Amplifiers."

Major Herbert J. Flagg retires after 21 years as chief engineer and executive officer, Board of Public Utility Commissioners of New Jersey. He is now a consulting engineer.

Schlitz

adds power capacity ...modernizes distribution system with WAGNER TRANSFORMERS



This is one of the Wagner-equipped unit substations that modernize power distribution at Schlitz. The Wagner Sealed Dry-Type Transformer is rated 1000 kva.

Jos. Schlitz Brewing Company, Milwaukee, Wisconsin.

A continuing program of modernization is one of many reasons why the Jos. Schlitz Brewing Company is a leader in industry. Plant power distribution, for example, has been modernized and expanded to assure an uninterrupted flow of electric power for production of "The Beer That Made Milwaukee Famous."

Schlitz chose Wagner Sealed Dry-Type Transformers for their power distribution load centers. These modern unit substation transformers can be safely installed in any load center—any place—because they are hermetically sealed in welded steel cases to provide positive protection from contamination, fire and explosion hazards. The only maintenance they require is a periodic checking of gas pressure (inert nitrogen), case and bushings.

Wagner Sealed Dry-Type Transformers can serve your power needs just as they do at Schlitz. They are "Predesigned"—coordinated with the specifications of unit substation builders to save job engineering, time, and money. Consult the nearest of our 32 branch offices, or write for Bulletin TU-214 for full information.

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...to help America LIVE BETTER—*Electrically*

LIVE BETTER ELECTRICALLY

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WT58-9

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

Dresden Nuclear Container Sphere Leak-Tested Economically (*Continued from page* 33)

sphere rechecked by soaping for leaks that might have opened during the overload test. Drain lines previously installed were blown clear of moisture. A recording hygrometer checked the humidity within the sphere during the test.

With the inner chamber systems isolated from the sphere by the water in the differential manometers, air was discharged from the sphere until the chamber pressures were about 5 cm of water greater than sphere pressure. At this point the sphere pressure was about 27.5 psig.

Morning Tests Set

Thermocouple readings during the procedure established that relative temperature changes between reference systems and sphere were virtually zero between 1 and 6 AM. Accordingly, the actual leak-rate test was made over this period on two successive days.

Using the relationship

$$\% \text{ Loss} = \frac{\Delta P_i - \Delta P_f}{P_1 \times 13.6} \times 100$$

where ΔP_i is initial pressure differential between sphere and reference, cm (water)

ΔP_f is final differential, and

P_1 is initial sphere pressure, cm (mercury) absolute, leakage loss was calculated.

Assuming equality of temperature between sphere and reference systems, the maximum leakage measured by either the single or multiple reference system was 0.03% per day. If the most pessimistic reasonable assumptions regarding temperature inequalities are allowed, the leakage could still not be credibly greater than 0.1% per day under the test conditions.

Determinations Agree

The results of the single and multiple reference systems determinations showed excellent agreement. The sphere was pronounced acceptably tight by representatives of CB&I, GE, and Bechtel.

The results showed conformation or position of reference systems had negligible effect. With confidence thus gained, and with reference system tightness double-checked by initial pressure to some small amount over sphere pressure, engineers may conduct future tests with only one reference system.

Scores Original-Cost Accounting (*Continued from page* 39)

puted a frequently drawn conclusion: That the rapid growth of property at current prices automatically results in a fair-value rate base.

"I have not seen any figures indicating that the unit cost for the large new machine will be lower than those for the older, smaller machines and, generally speaking, it will be anything up to 25% higher," he declared.

Capital Paid Out

Noting that since 1947, as inflation gathered speed, increasing amounts of common dividends were paid out of capital, Guercken continued: "In 1947, of the $398 million paid in common dividends, $86 million—21.6%—were in a deficit position, paid out of capital. By 1956, of the $861 million of common dividends paid, $300 million—34.9%—came from capital.

"Since 1937, $1.3 billion of the $9 billion of common dividends paid was in effect not earned, and hence paid out of capital," he said. "This amount is about half of both earned and capital surplus of the Class A and B utilities as of the end of 1956."

Denial of a tax deduction to utility companies for advertising costs could lead to a denial of free speech, Dwight C. Van Meter, N. W. Ayer & Son, Inc., told the association. He noted that as soon as the Electric Companies Advertising Program said that the United States was in the power business, great adverse pressures began to develop.

But the Internal Revenue Service's denial of a tax reduction, he said, brought a strong response favorable to the industry from many fields. At least 500 editorials appeared in newspapers opposing the move of the IRS, and civic groups, publishers, state commissions, press associations, and a number of Congressmen protested.

"The right to defend oneself and tell one's story to the public," he said, "is the right of both individuals and corporations."

The utility executives heard Irving P. Krick, Irving P. Krick Associates, Inc., describe technological developments in atmospheric physics, particularly in ultra-long range weather forecasting and weather control.

"Such developments," he said, "herald a new era in utility management planning."

"Degree-day accumulations, in relation to domestic heating loads, can be used together with reliable weather projections, for anticipating accurately that portion of gas and electricity loads," he said. "Such projections will in turn assist management in determining overall operating revenues in relation to operating costs."

Applications Cited

Studies of the effect of cooling degree days in summer on air conditioning loads, he said, are important where such loads are beginning to produce peaking in excess of winter peak loads. Anticipation of hot weather intervals assists management in preparing maintenance schedules, and long-range forecasts are important in planning new system capacity.

"Projections of precipitation and temperature converted to streamflow for a number of years," he said, "can be used effectively in programming hydroelectric plant development or expansion."

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Readers Forum

An Extra Zero

To the Editor:

We always suspected that there might be a slight bit of exaggeration in some of the stories attributed to the great state of Texas.

Walter Castle
Castle Engineering Co
4959½ N. High St.
Columbus 14, Ohio

1200 KVA of capacitors on Texas Pole, not 12,000 kva as reported in our Oct 20 issue

British Accounting Different

To the Editor:

From the explanatory notes you have been good enough to let me have it is now clear that the earned rate I attribute to the English nationalized electricity industry is not comparable with the average rate you calculated for the U. S. power companies included in your survey (EW, May 5, p 98). The respective rates are not comparable partly because my figure of gross income includes, whereas yours excludes, payments in respect of income tax liabilities.

In the absence of the relevant data it is difficult for me to say what the earnings rate of the U. S. companies included in your sample would be when expressed gross of income tax. According to the 37th Annual Report of The Federal Power Commission, however, the average gross rate in 1956 for privately owned class 'A' and 'B' companies was about 10 per cent. of capital against 5 per cent. earned on the average by the electricity industry in this country during the last few years.

But it would be misleading to assume that the wide difference in the respective grossed-up rates corresponds with the difference in income tax rates applied to the profits of the two industries. To avoid the risk of misunderstanding perhaps I should say that the nationalized industries in this country are liable to the same income tax rates as private industry. That is to say, our taxable surpluses are subject to a combined income and profits' tax rate of over 50 per cent., which I think is at least as burdensome as the combined rate in your country. We also pay taxes in lieu of local government rates which, as you mentioned in your letter, equalled nearly 4 per cent. of our operating revenue 1956/57.

The most important reason in explanation of the smaller impact which taxation has yet had on the finances of our industry, as compared with yours, is to be found in the modest surpluses we have made on trading in the interest of restraining unavoidable tariff increases to a minimum. Any departure from this policy would sharply increase our tax liability, sooner or later, depending on the scale of "initial allowances" (accelerated depreciation provisions) credited to us under the Finance Acts in respect of new capital expenditure which is continuously expanding.

L. O'Donnell
Head of Economics &
Statistics Branch

The Electricity Council
Trafalgar Buildings
1 Charing Cross
London, S. W. I.

Advertising Index

Air Preheater Corp. 21
Allis-Chalmers Mfg. Co. 8, 9, 22
Aluminum Co. of America 86, 87
American Chain & Cable Co., Inc. Page Fence Ass'n. 90
American Creosoting Corp. 57

Baltimore & Ohio Railroad 6
Blaw-Knox Co. 61
British Insulated Callender's Cables Ltd. 59
Brown Company 60
Bussmann Mfg. Div., McGraw-Edison Co. 16, 17

Chance Co., A. B. 70
Chase Brass & Copper Co. 91
Chase-Shawmut Co. 66

Directory of Engineers 94

Engineers, Directory of 94
EnJay Company, Inc. 4

Federal Pacific Electric Co. 10

General Electric Co. Apparatus Dept. ..... 2nd Cover, 40, 41, 43, 44, 45
Gulton Industries, Inc. 54

Hornblower & Weeks 92

Indiana Steel & Wire Co., Inc. 92

Johns-Manville 56

Kaiser Aluminum & Chemical Sales, Inc. 55
Kaiser Engineers Div., Henry J. Kaiser Co. 18

Lapp Insulator Co., Inc. 7
Line Material Industries 15

Moloney Electric Co. ..... 4th Cover

Natvar Corp. 73
Newport News Shipbuilding & Dry Dock Co. 20

O. Z. Electrical Mfg. Co., Inc. 71
Ohio Brass Co. 19

P. W. Industries, Inc. 90
Page Fence Ass'n. American Chain & Cable Co., Inc. 90
Pennsylvania Transformer Div., McGraw-Edison Co. 68, 69

RT&E Corp. 51
Reliable Electric Co. ..... 3rd Cover
Remington Rand Div. Sperry Rand Corp. 67
Revere Copper & Brass, Inc. 74
Rome Cable Corp. 64, 65

S&C Electric Co. 48, 49
Searchlight Section 95
Shaw-Perkins Mfg. Co. 92
Southern States Equipment Corp. 50
Standard Transformer Co. 89

Tobe Deutschmann Corp. 52, 53

United Nations 88

Victor Insulators Div. I-T-E Circuit Breaker Co. 47

Wagner Electric Corp. 93
Westinghouse Electric Corp. 62, 63, 79, 80, 81, 82, 83, 84

PROFESSIONAL SERVICES 95
CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 95

EQUIPMENT (Used or Surplus New) For Sale 95

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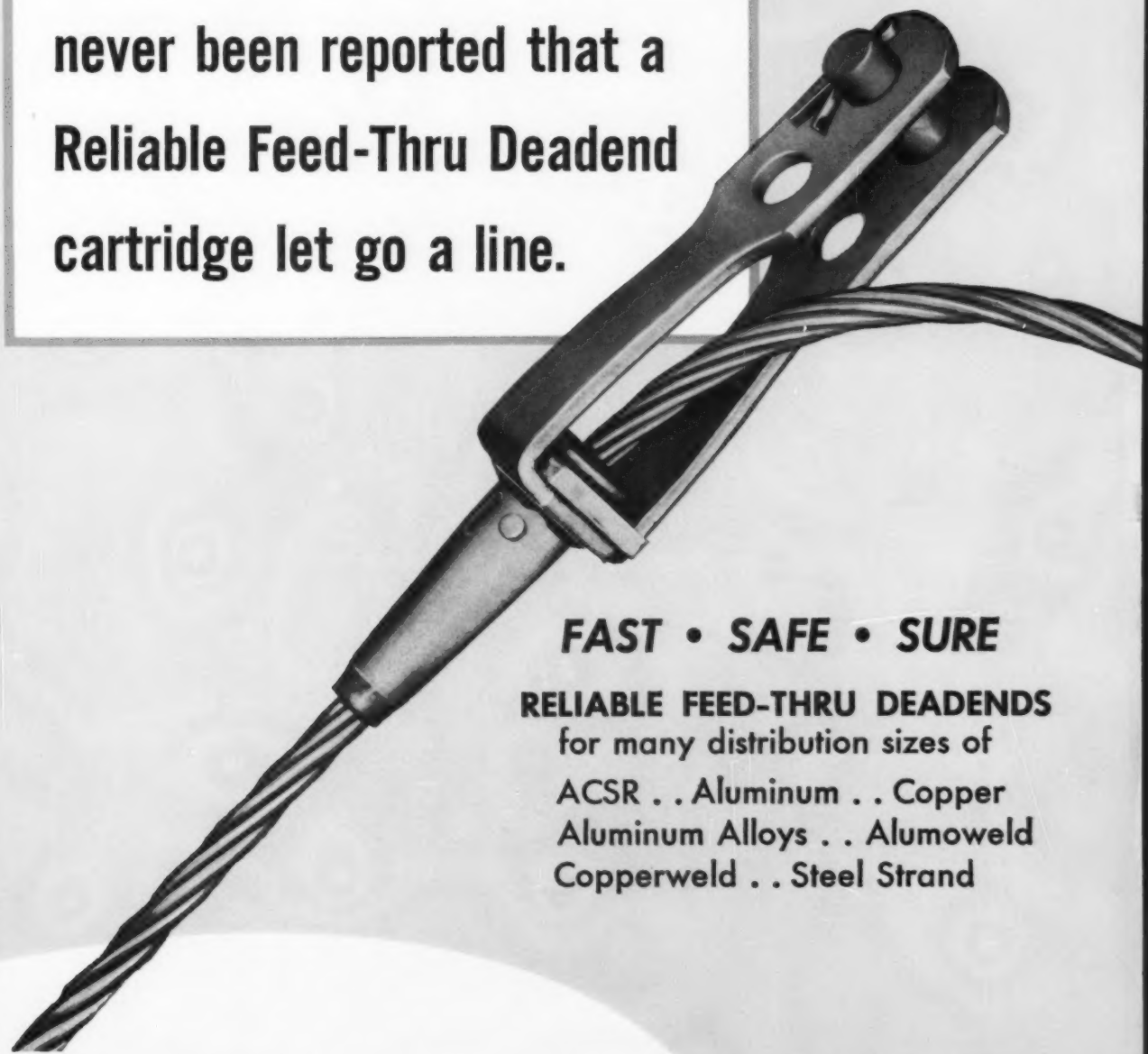

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ME50-30

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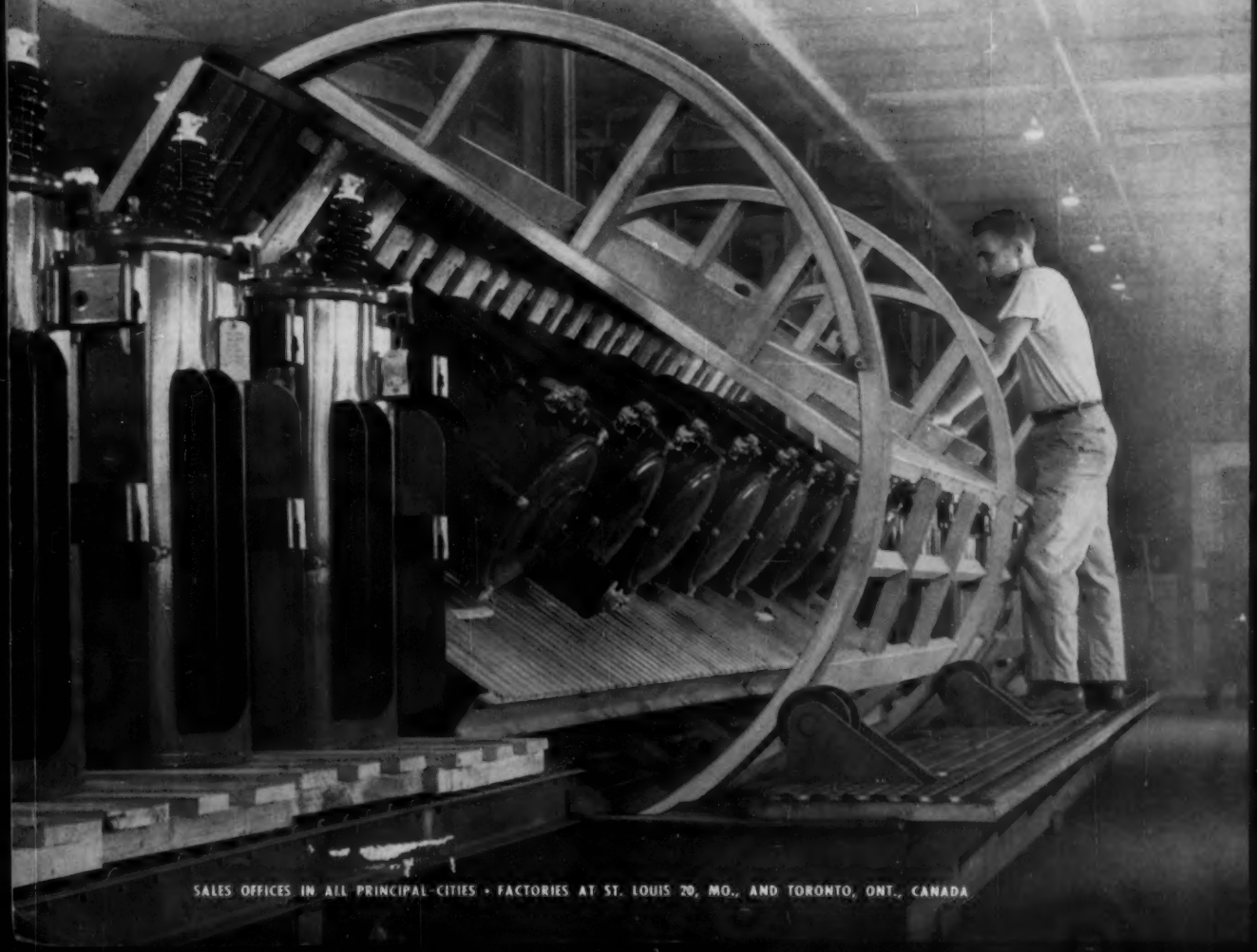

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